

NATURE MAGAZINE



February, 1949

50 Cents

Vol. 42, No. 2

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Help for Corregidor

When the tides of war swept over it, the library of Corregidor College, Guimba, Nueva Ecija, Philippine Islands, was completely destroyed by the Japanese. Today the college and high school are operating again with an enrollment of 1400 students, starting without text or library books. E. R. Dizon, president of the College, was thus working with scant tools. Then came Miss Ethel Hook, director of the Pickler Memorial Library at Northeast Missouri State Teachers College, Kirksville, Missouri. She appealed to book publishers to contribute books, enjoying a generous response. She then appealed to magazine publishers, and also enjoyed response, in which the American Nature Association joined. It was our thought that members of the American Nature Association might have books, or, perhaps, bound periodicals, they might wish to contribute. We wrote Miss Hook to ask her and she replied that she was certain such material would be valuable. In view of red tape involved, and her possession of the proper customs declarations, she suggests that any contributions be sent to her at the Missouri address, and she will forward larger assembled packages. The new library at Corregidor College has appropriately been named by the trustees "The Ethel Hook Library."

Bill Mann Reminiscences

Ant Hill Odyssey. By William M. Mann. Boston, 1948. Little, Brown and Company. 338 pages. Illustrated. \$3.50.

One of our favorite people is Bill Mann, Director of the National Zoological Park, so, perhaps, we should immediately disqualify myself as a reviewer of his autobiography. This we refuse to do because we are certain that every reader will enjoy this book as much as we have done, and will follow his early roamings over the face of the earth with as much fascination and secret envy. Bill Mann seemed destined so to roam, and he never failed to egg his destiny on; never overlooked an opportunity.

Bill Mann's interest in Nature was as inborn as it is in most boys, but where the majority set it aside as they grow older, his interest only became more intensified. He started his roaming under the impression that he had done something criminal when he brought in a herd of cows late for milking, so departed his Helena, Montana, home and turned up as an all-around, although youthful, hand on the ranch of Ed Skinner. Ed finally penetrated to the facts of Willy Mann's origin and restored him to his mother. Then came a period of Staunton Military Academy, punctuated by as much time as could be devoted to Nature, including several summer weeks cleaning cages at the National Zoo, which later he was to head.

Wherever Bill Mann went he was collecting, insects in general and ants in

particular, these last being his first and enduring love. From a period of ranching—and collecting—in Texas—he gravitated to Washington State College, then to Stanford and, finally, to Harvard. Trips afield took him to Brazil, Haiti, the Holy Land with the late John C. Phillips, to Fiji, and other far places followed, with Bill ever avidly collecting for himself and others. The informal stories of his experiences carry the reader along from place to place as a vicarious member of his party, or as his companion.

These were years rich in adventure and in accomplishment and Bill Mann tells of them in a free and friendly style that is characteristic of the man. And his ant hill odyssey ends when he decides to take an examination "and commence the highly paid, carefree life of a government employee." Thus this book is only the first volume, we certainly hope, of the biography of William M. Mann. He has not stopped roaming about the world, and his years as Director of the National Zoo have been as full, as varied and as fascinating as his earlier ant hill explorations. *Ant Hill Odyssey* leaves the reader eager for the rest of the story, and thankful for the first installment. Exploring with Bill Mann is a virulently contagious disease, so do not miss the opportunity to contract it. R.W.W.

Nature's Realm

Nature's Undiscovered Kingdom. By Walter J. C. Murray. New York, 1948. The Macmillan Company. 98 pages. Illustrated \$2.00.

This is a collection of delightfully written and charmingly illustrated stories of the author's Nature experiences in Great Britain. The wildlife he has encountered is varied.

Bird Psychology

Bird Display and Behaviour. By Edward A. Armstrong. New York, 1948. Oxford University Press. 431 pages. Illustrated. \$5.50.

While this volume will appeal first to ornithologists, and other scientists to whom bird psychology constitutes a field of interest, there is much in the book that will appeal to the average bird student as well. The text, which brings together a great deal of material within the bounds indicated by the title, is presented as free from technicality as is possible with such a volume.

Sickness in the Forest

Forest Pathology. By J. S. Boyce. New York, 1948. McGraw-Hill Book Company. 550 pages. Illustrated. \$6.00.

This is a thoroughly revised second edition of this important text on forest diseases, first published in 1938. Extensive revision of the first edition has taken place in the light of increased research and information, thus bringing this standard text completely up to date.

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Nature in Print

By HOWARD ZAHNISER

IT is a misty, cold November day. Here in the cloistered silence of a library within New York State's Grecian temple of education in Albany, I can hear the distant charm of some Christmas chimes. Away from home, seeking out this sequestered place to meet the compulsions of a monthly magazine's schedule, I experience a pulsation of nostalgia—and a great reluctance to define my mood and thought in matter-of-fact words. In the bustling circumstances of a traveler to conventions and meetings, in the solitude of a hotel, in the privacy of railroad trains I have lately been reading (by choice) two books by men who eschew this hurly-burliness from which I have here withdrawn (although they nonetheless, I believe, would both share my satisfaction with this retreat), and I am very much under the spell of their joyous remembrances of what seems a sure happiness forever. Such a compassionate exaltation I cannot remember, from many, many, books!

It is Elliott Merrick, really, who has induced this quiet exaltation, with his spell of writing that he calls *Green Mountain Farm*, but the mood finds sustenance also in this other volume I have been reading—*Copsford*, by Walter J. C. Murray—and I must get on with telling you about them.

Both these men sought out rural places to live, and, for the sake of living in them, left the city.

Mr. Merrick lost his job as a truck driver "in the depths of the great Depression of 1932" and, although he and his wife Kay were both city bred, used the ill fortune as an opportunity to venture on a farm. "We struck out," he says, "for Vermont, northern Vermont, largely because of its lakes and little roads and hills." The place they eventually picked was "rocky, relatively infertile, full of steep, cut-up little fields . . . infinitely far from markets." But it just happened, he says, that they liked this farm and were happy on it, "largely," he says, "because it has some wilderness to it." Mr. Merrick declares: "We did everything wrong, but it turned out right."

Green Mountain Farm is the chronicle of this righteousness. Mr. Murray left "the hive of London." He testifies to a "desire to live alone," and he writes about "the misery of a third-floor-back off King's Street, S.W.1," where he "had just managed" to keep himself "on the uncertain income of a freelance journalist." The cottage that he found was derelict, rat-infested, and, although not far from London, was so far from a lane or road that Mr. Murray could afford to rent it. Demand for such a cottage, he says, "is in inverse proportion to the square of the distance between it and the ordinary services and comforts of civilized life." *Copsford* was not in demand at all. "The open country surrounded it like the southern ocean about a coral island."

Here Mr. Murray lived, some ten months or so one year, with his dog, Floss. The solitude was interrupted occasionally by visits with (sometimes bicycle journeys with) the music teacher in the village a couple of miles away. "To the Music Mistress this book is dedicated." It was she who helped prospect for the cottage, in fact, and one actually wonders if she did not have a great deal to do with characterizing the solitude of *Copsford*—in prospect and retrospect both. Perhaps there was gentle conspiracy. We hear little of it, but there is an atmosphere about *Copsford* that seems not precisely the air of a solitary wanderer with his dog.

The charm of *Copsford* is a bit quaint—delightfully so! precious!—and this quaintness is intensified by the fact that Mr. Murray's livelihood is largely that of a Green Man. He gathers herbs!

"During my chequered freelance career," says Mr. Murray, "it had been my fortune—fate if you will—to come into contact with someone who knew all about the collecting and harvesting of wild herbs. . . . In time I found myself dallying with the idea. . . . Thus would I make ends meet. Thus would I escape the city and live as I had often imagined and desired, right against the heart of Nature."

Copsford is a collection of essays with the titles of these herbs — "Clivers," "Foxglove and Centaury," "Agrimony," "Traveller's-Joy," "Meadow-sweet and Tansy," "Eyebright," "Yarrow," and "Sweet Chestnut." These delightful essays, together with some introductory chapters and two in conclusion called "Accounts" and "Winter," are in *Copsford* the record of Mr. Murray's escape from the city, his life "against the heart of Nature."

There are many parts of *Copsford* that will be valued for their intrinsic interest in the herbs, the other plants, the insects and other creatures that Mr. Murray observed. It is a "nature book" all right, and Mr. Murray's photographs, presented for the most part in full-page size, are strikingly beautiful. Yet the dominant interest will be in his way of life, I believe. For "nearly eight months" he lived "a carefree gypsy life." He records that "small sums of money had trickled in during that time, partly from freelance

journalism, partly from small quantities of fresh herbs." The payment for the bulk of his herb harvest came in a "cheque drawn for £34:4:2." (His "literary work" during the 8 months had brought him £24:9:6.) But he had found that "living in the country was much cheaper than living in the town," and *Copsford* to him was "a suitable place to muse on the intrinsic value of things." Those herbs, he calculated, "whether they were to be used for medicinal or culinary purposes, whether they were to be tonic or tobacco," seemed beyond price as "the sweet plants of our English countryside." Such a sense of values reckoned little of urban deprivations, but after all Mr. Murray felt "the tension between the gregarious instinct and the solitary." After nearly a year alone he "needed company," and thus his sojourn at *Copsford* did not survive the late winter floods that all but marooned him. He left, but he took with him the records and recollections that are now inscribed into this delightful volume, *Copsford*.

Tulip Retrospect

By ULRICH TROUBETZKOY

Ogier Ghislain de Busbecq long ago
Strolled in a Turkish garden where he saw
The little turban-flower, *toliban*—
Bulbs from the valleys of Bokhara sprung
Gold-petalled, crimson-cupped, with pointed
leaves.

So, covetous for home, the Flemish fields,
"I paid dear for the seed", his Latin said,
And frugal burghers let their guilders go,
Squandered their florins, gambled louis-d'ors
On the witch-lily with a Persian name.

Learned Clusius of Leyden, in his sleeve,
Smuggled the bulbs to England where they bloomed
For Marlowe, Raleigh, romping red-haired Bess,
The cottagers of Sussex and of Surrey.

And now my turbanned viziers in the sun
Give me the homage meant for Suleiman.

But I read nothing experimental, nothing tentative, in Elliott Merrick's *Green Mountain Farm*. Its reality is not a recollection but something that seems continuous, even as the volume ends, and I suspect that that is the secret of the exultant sense of vitality that I have experienced with it. Its interest centers deep in the richness of our human life lived in natural simplicity—in natural human simplicity. This is not a book about wild creatures, not a book about farming and rural life either—essentially—but, rather, a record of the happiness that men and women can know when they live in harmony with their own natures.

"Bliss," Mrs. Merrick exclaims once. "Pure, unadulterated bliss." It was from her hospital bed a few days after the baby was born. "She held out her arms," writes Mr. Merrick, "and her fierce maternal beauty and strength went through me like a twenty-volt current." In lesser degree but in truth throughout this volume there is this sort of bliss, and again and again one feels a voltage, so strongly is the book charged with vitality.

This, it seems to me, is the essential and distinctive virtue of *Green Mountain Farm*.

Here, however, is as interesting an account of the adventures in farming as one might wish for, and here is a better presentation of the interesting rural inhabitants that one finds as neighbors on a farm than I have ever read before. One chapter that has to do with such characters, I note, appeared originally in the *New Yorker*, and any reader of *Green Mountain Farm* is certain to enrich his store of anecdotes.

Aside from Mr. Merrick's record of his life with Kay and with their children—Kim and Austen and Susan—my own greatest interest in this volume has been in its references to a love of the quality of wildness, especially, as Mr. Merrick puts it in one place, in "the wild and the civilized side by side, and we in the middle, picking and choosing a little of each." This expression, it is interesting to point out, is in a chapter telling of a canoeing vacation that Elliott and Kay Merrick took on Lake Champlain. "Perhaps," says Mr. Merrick elsewhere in this chapter, "sailing is for me the symbol of the good ancient-primitive and the good modern-technological that we are trying to achieve."

Perhaps *Green Mountain Farm* is for me an expression of the good attitude toward living that we are trying to achieve, whether the setting is wild, rural, urban, or suburban. As Mr. Merrick says in its concluding paragraph:

"In me and in my children, I hope, will be a consciousness that natural things are as powerful and all-pervading as they ever were in the time of the pagan Greeks and the wine-dark sea and the sylvan gods. The springtimes come, when

the maple leaves unroll 'as big as a mouse's ear'; the wild roses bloom; the blackberries ripen; and these things will go on, as the old New England land deeds phrase it, 'as long as grass grows and water runs.' It is good to know all this, for there is really nothing else."

Green Mountain Farm. By Elliott Merrick. New York: The Macmillan Co. 1948. 209 pp. \$3.50.

Copsford. By Walter J. C. Murray. London: George Allen and Unwin Limited. (New York: The Macmillan Co. distributors.) 1948. 164 pp., with 25 photographs on 23 plates. \$3.50.

Flying Carroussel

The Merry-go-round Has Wings. By Elinor Henry Brown. Published by the Author at 11123 Erwin Street, North Hollywood, Cal. 28 pages. Illustrated. \$5.00.

This is an attractive little collection of poems intended for the reading and hearing of the younger set, and they certainly will enjoy it.

Boy's Snake Book

Boy's Book of Snakes. By Percy A. Morris. New York. 1948. The Ronald Press Company. 185 pages. Illustrated. \$3.00.

Before they have absorbed the usual adult misinformation, young people, particularly boys, often have an active interest in snakes and how to keep them as pets. This excellent book will be immensely valuable in teaching young people—and through them their parents—how to recognize, understand and care for snakes, so many species of which are valuable, beautiful and interesting. We can think of no better gift for a snake-loving boy than this book.

Famous Dog Stories

Famous Dog Stories. Edited by Page Cooper. Garden City, N. Y. 1948. Doubleday and Company. 336 pages. With 99 illustrations by Diana Thorne. \$3.50.

Dog lovers—and they are legion—will delight in this well-selected anthology of dog stories that have stood the test of time and achieved a sort of canine classicism. The stories range all the way from the tale of Ellis Parker Butler's "Fluff" to "Red Wulf" from Alfred Oliviant's imperishable *Bob, Son of Battle*. Beautifully illuminating the stories, and bringing to life the dog actors in them, are the illustrations by Diana Thorne, who certainly needs no introduction to the world of dog enthusiasts.

For Artists

Drawing Sea and Sky. By Victor Perard. New York. 1948. Pitman Publishing Corporation. \$1.00.

This is one of the series of basic practice books for beginning artists brought out by this publisher.



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NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION
To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and
Devoted to the Practical Conservation of the Great National Resources of America

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To Our Members and Readers:

We need your advice. Indeed, we need it very much! As many of you already realize, *Nature Magazine* is a non-commercial, educational publication. As such, it has always been operated at a deficit, financially. In the past these losses, together with the expenses of related educational work of the Association, have been met from endowment income.

Since the end of the war, when controls were lifted, the costs of production—paper, printing, engraving and the like—have doubled. Salaries of clerical staff have had to be increased. All other costs have risen. Reluctantly, we increased the subscribing membership fee from \$3 to \$4. Even so, the loss from carrying on our work has continued to mount—with a new 13.7 percent increase in printing costs just going into effect—straining the capacity of reserves to meet it.

This is a frank, although necessarily brief statement of the situation. The same problems face many another constructive endeavor. We are thus frank because we believe that people interested in *Nature* and *Conservation* are a special kind of folks; that they want to know facts.

These problems suggest the need of a survey of the magazine—which is our major means of carrying on our educational work. Will you, then, carefully consider and answer the questions on this page, and on

the reverse? Will you then cut the lower half of the page along the dotted line and mail it to *Nature Magazine*, 1214 16th Street, N.W., Washington 6, D. C. This will take a little effort, an envelope and a stamp, but, believe us, your advice will be more helpful than, perhaps, you can imagine.

We have divided the questions into four groups—Editorial, Conservation, Advertising and General.

EDITORIAL * * *

Physically we are not able to afford fancy layouts, highly expensive paper, and use of prohibitive (to us) color. Textually, however, we have tried to present much more material than any other publication in our field. We have worked to make this material interesting, informative and largely of permanent value. The questions under "Editorial" seek to discover how you feel we have succeeded.

CONSERVATION * * *

Nature Magazine has always been independent and unafraid in its conservation policies. Its interest in wildlife has been for wildlife itself. Yet we have not opposed hunting so long as it involves harvesting only a proved and provable surplus of game animals. We have defended national parks and forests, urged

(Cut on the Dotted Line)

The Questions

EDITORIAL * * *

Generally, are the main articles sufficiently varied?
Yes..... No.....

Is the emphasis too scientific..... too simple.....
about right.....?

What is your major interest? Please indicate by
1, 2, 3 etc. Birds..... Mammals..... Flowers.....
Trees..... Insects..... Fishes..... Reptiles..... Gar-
dening..... Astronomy..... Geology..... Other.....

Should we eliminate Book Reviews? Yes.....
No..... Camera Trails? Yes..... No..... Micro-
scope Department? Yes..... No..... School Page?
Yes..... No..... Poetry? Yes..... No..... Other
Feature?

What would you like to have included that is not
now covered?

CONSERVATION * * *

Do you agree with our wildlife policy? Yes.....
No..... Are we too severe with hunters?..... Not
severe enough?..... About right?..... Do you regard
sport killing as morally wrong?.....

Do you believe that national parks should be pro-
tected against exploitation?..... Do you favor in-
creased establishment of wilderness areas and in-
volute wildlife sanctuaries?..... Do you favor re-
striction of rural billboards?..... Would you wish
more strictly conservation articles in the magazine?
..... Have you any conservation policy suggestions?

wilderness preservation, sought restriction of rural billboards, fought selfish exploitation of waters and public lands, and stood in the public interest in many conservation battles. The questions under "Conservation" seek your opinion on these policies.

ADVERTISING * * *

Advertising is the life-blood of most magazines. Nature Magazine has never enjoyed significant advertising support as a source of income. This is partly because it cannot consistently accept certain types of advertising. In some measure, also, our independence has cost us advertising support. More reader-supported advertising would solve many problems, but the trend seems in the opposite direction. One advertiser, who has had a page advertisement in every issue for many years, has withdrawn because increased rates of large, commercial magazines forces cutting off smaller publications. Answers to questions under "Advertising" will be most helpful.

GENERAL * * *

There are several general questions that will provide us with valuable data, and we hope you will give them attention.

We thank you for your help and your opinion. If you want to expand on any point a letter accompanying the questionnaire will be appreciated. Be as constructively critical as you wish.

(Cut on the Dotted Line)

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Would you object to arms and ammunition advertising? Yes..... No..... To cigaret advertising? Yes..... No..... To liquor advertising? Yes..... No..... Do you now patronize Nature Magazine advertisers? Yes..... No..... What advertising do you feel should be in our pages and you would support? Horticultural?..... Photographic?..... Microscopes?..... Travel?..... Books?..... Other?.....
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Play golf?..... Tennis?..... Other sport?..... Take pictures?..... Travel?.....

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GENERAL * * *

Do you use the magazine in school work?..... Do you pass it on to others?..... How many in family?..... How many read our magazine?..... Do you preserve it?..... How long have you been receiving it?..... years. Do you own a home?..... Automobile?..... Maintain a garden?..... Fish?..... Hunt?.....

There is no need to sign your name unless you desire to do so. We would, however, like to know how you keep the wolf from the door. It would help us in evaluating your assistance.

Name:

Address:

Business or Profession:

Contents Noted

IN LAST November's issue of *Field and Stream* Hart Stilwell writes an article answering his title, "Is Mexico Slaughtering Our Waterfowl?" His conclusion is that Mexican kill of the birds is grossly exaggerated, and that the annual harvest by our neighbor to the south is less than the number of waterfowl shot in the United States on the opening day of the season. Mr. Stilwell cites figures, facts and authority in support of his contention that this explanation of waterfowl shortages has been overplayed. He points out that batteries, market hunting and no-limit kill are outlawed by the Mexican government and that enforcement is improving. Close on the heels of Mr. Stilwell's authoritative article comes *This Week*, a Sunday magazine widely circulated through newspapers. In its November 28 issue appears an article entitled "Mexican Duck Trap", written by Bob Deindorfer. An editorial note states categorically that the answer to short seasons and small limits in the United States lies in Mexico. Mr. Deindorfer, addressing the duck gunner, avers that he is being swindled. "You're the victim of commercial hunting and its wholesale slaughter of game birds," he insists. He goes on to describe an "armada" of guns banked in three tiers, and being fired one after another, taking a terrific toll of birds. The implication is that such devices are widespread and that the Mexican harvest of waterfowl is tremendous. Thus we have two quite opposite statements, adding to the confusion of the duck hunter, the bird conservationist, and the public generally. Commerce in waterfowl must, of course, be effectively outlawed in Mexico, and this ban enforced, before waterfowl conservation and management can become truly operative there. But we are inclined to go along with Mr. Stilwell in his contention that Mexican authorities should be encouraged in making progress rather than attacked for failures in the face of great odds.

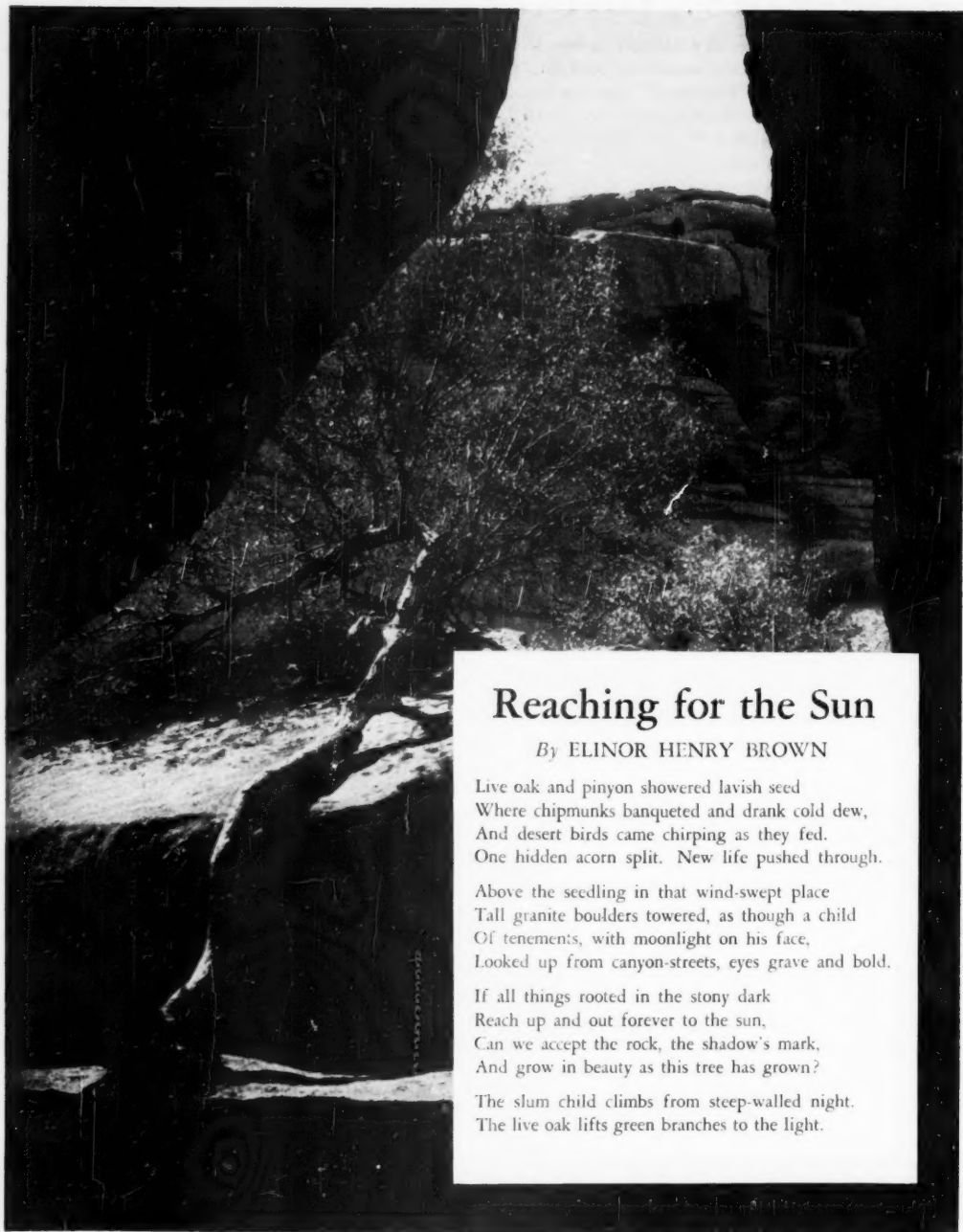
ADDRESSING fellow conservationists, George B. Fell of 303 Penfield Place, Rockford, Illinois, makes an appeal that should be answered. Inspired by a resolution of the Illinois Academy of Science urging study of the problems involved in establishing a system for preserving small natural areas, Mr. Fell seeks to do something about this. "Unmolested natural areas," he says, "are indispensable for an adequate understanding of the ecological processes of nature that have such a fundamental control over our lives." Park and forest areas have been set aside, but these serve a major recreational purpose or are managed to provide a crop of trees or game animals. Some areas, often small, have escaped axe, plow, grazing, fire and other results of contact with civilization. These are natural, primitive spots where Nature still reigns.

Their acquisition would require appropriated funds and, probably, enabling legislation. Mr. Fell offers to serve as the intermediary between public and legislature. He would like to hear, first, opinion as to the importance of such areas, and, second, details of specific suitable natural areas in Illinois, however small, that should be investigated for inclusion in such a program.

USING Pittman-Robertson funds, the California Division of Fish and Game is embarked on a three-year study to determine the survival ratio of farm-raised pheasants compared to completely wild birds. Various techniques are being employed, in one instance a careful check being made of two special areas, one heavily stocked with pen-raised birds and the other left to Nature for restocking. Bands recovered from birds killed will be important clues to the answer. With the question of the wisdom and usefulness of game farms distinctly moot, these days, the results of this study should be interesting. It has always seemed to us that game birds brought up in the tender surroundings of rearing pens come pretty close to being domestic fowl and, therefore, their release for hunting rather silly. And some game managers contend that such semi-domesticated birds just cannot "take it" when turned out on their own. There appears to be a lot to be learned in this field, but, for our money, Nature offers the best bet if allowed to perform unmolested.

INDICATIONS are that Secretary of the Interior Krug may soon return to private business. In this event we hope that President Truman will advance to this post Oscar Chapman, whose service under Mr. Krug has proved him to be an informed and sincere conservationist. Mr. Truman has shown a disposition to consider career men best for such important positions, and Mr. Chapman would be another such appointment.

JUST in case you have passed it over, on the two preceding pages is a questionnaire. Some people are allergic to these; others enjoy the mental excursion they provide, and the opportunity to advise, as well as to crystallize one's thoughts. We hope that many of our readers will make the effort involved in answering the questions asked and will read the reasons for our asking them. Perhaps those of our members who live on fixed incomes these days will be particularly interested in being helpful, for they are in the same boat we are—caught between increased prices for just about everything, and with just so much of the coin of the realm coming in. So, if you have passed the queries by, we hope you will turn back and give them your attention. Thanks! R. W. W.



Reaching for the Sun

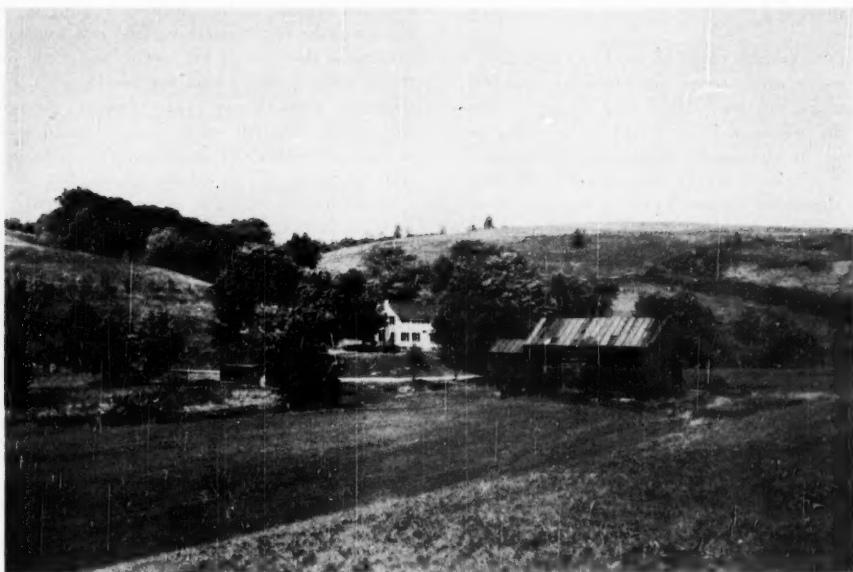
By ELINOR HENRY BROWN

Live oak and pinyon showered lavish seed
Where chipmunks banqueted and drank cold dew,
And desert birds came chirping as they fed.
One hidden acorn split. New life pushed through.

Above the seedling in that wind-swept place
Tall granite boulders towered, as though a child
Of tenements, with moonlight on his face,
Looked up from canyon-streets, eyes grave and bold.

If all things rooted in the stony dark
Reach up and out forever to the sun,
Can we accept the rock, the shadow's mark,
And grow in beauty as this tree has grown?

The slum child climbs from steep-walled night.
The live oak lifts green branches to the light.



This is the center of Alan Devoe's one hundred and twenty-five acre world, to the horizon of which one does not need a telescope for seeing.

Home-Acre Naturalist

By ALAN DEVOE

THE world in which I live, and have been living now for many years, is a world about one hundred and twenty-five acres in extent. It runs from what an early deed calls "a staddle of oak," on top of a wooded hill, over along the ridge to my nearest neighbor's upland buckwheat-field, and then down into the valley to take in a forty-acre pasture and a length of winding brook and a bit of swamp, and then back uphill again to enclose a small pine-knoll.

That is the entirety of my world. In the last ten years I have left it, under this or that necessity, only very rarely and very briefly. The books I have written are products of living upon this one small patch of the planet. My thoughts have grown here, along with the sweet-fern and sumac that have grown on the stony hillside. What in large moments I should call my philosophy has been formed between the staddle of oak and the swamp, shaped by brook-happenings, pointed up by something I have seen a white-tailed deer do in the dark hemlock-woods on the northwest shoulder of the top of the hill. I live in a world of which the outermost rim can be seen without any need to use a spy-glass.

But it is not, I should insist, a small world. All worlds are pretty much the same size; which is to

say that all worlds are big enough to let a man devote a lifetime to contemplating them and still remain, at the end, only a partial knower indeed. The round world of our whole planet, obviously, is so big that no man can possibly come to possess more than a tiny acquaintance with it. But the same thing is true of a world a mile square, or of a world of a hundred and twenty-five acres, or of a world no bigger, for that matter, than what a man can see without stirring from his chair. As Fabre used to be fond of remarking, there is no getting to Total Knowledge about even one small ant. There is no exhausting the things to be found, and the thoughts to be engendered, in examining the microscopic world that is one drop of common pond-water. All worlds are endlessly enormous. And there are peculiar rewards, I think, for those whose worlds are bounded by narrow geographical bounds. I should like to talk about these rewards a little, and say why it is that I am made to feel—as I prowl everlastingly around the same fields, and go poking through the same hemlock woods, and go sloshing around in the same small swamp, in patrol of my world of one hundred and twenty-five acres—that I am as much an explorer as I could be if I journeyed to Patagonia or Nepal, and as much a learner in

natural history as I could be if I had access to great laboratories.

It is obvious enough to all of us, I suppose, that a man can see a small scene more vividly and intimately than he can see a large one. To try to contemplate the whole natural world is to suffer an exaggeration of the agony undergone by a small child trying to take in all the happenings in all three rings of a three-ring circus. Nature is too big for us. It is so big that it becomes invisible, it becomes an abstraction. We cannot see the forest for the multiplicity of trees; we cannot see animals, but only the

great busy parade of the abstraction called Zoology; we cannot see birds, but are lost in the enormous effort of trying to be the kind of all-knowing bird-man called an Ornithologist. What is seen sharp and clear, as we look at a little view, a little patch of the planet, becomes blurred and generalized when we try to see the whole enormous view of Everything. If our world of contemplation is little enough—say a drop of water—we can hope, in the course of a lifetime, really to get a pretty good, sharp, intimate notion of what a paramecium is like. When our world of contemplation is a bit bigger—say a matter of acres—animals and birds and trees and rocks and weathers still keep a certain vividness of identity, a kind of pungence of reality, about each and every one of them. But when there are no boundaries at all, and our world of contemplation is the whole world of all the phenomena that make up this stunning universe of

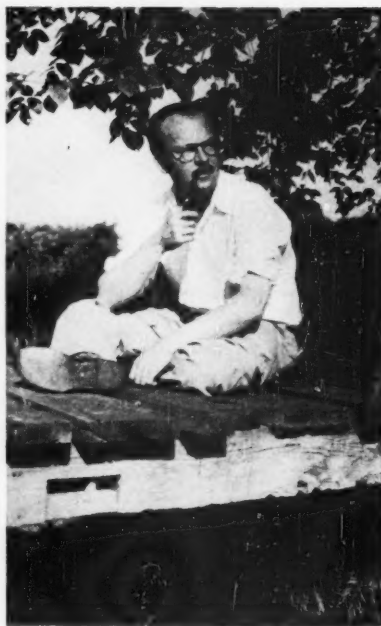
ours . . . well, then, I think, reality necessarily recedes from us. We begin to do our thinking in theory, losing touch with small, hard fact. We begin a great generalizing, losing touch with the clear immediacy of the particular. We grow learned about all foxes, and ignorant about the living fox—tawny-furred, lean-muzzled, and foxy-smelling—whom we used to know so thoroughly when our eye was on our farmyard.

All this makes for what is perhaps the greatest reward of living in a hundred and twenty-five acre world. It stays a real world, a sharp world, a truly known world. It retains its scent and color and feel, and does not die away from daily awareness. It is said that the meek in spirit shall inherit the earth. No doubt they shall, for it is only men of humility

who are capable of the glorious blessing of continuing astonishment. Something like this same paradox obtains in the case of big worlds and little ones. To try to take in the whole big world, with a sort of straining gluttony, is to be forever disappointed. But to rest content with a small world is to find it not only enormous in potentialities, as inexhaustible as those of the whole planet, but to find its contents vividly colorful, meaningful, richly scented and everlastingly exciting, in a way in which the "blooming, buzzing confusion" of the universe's totality certainly can never be.

"If you would see new things under the sun," John Burroughs used to say, "the way to go today is the way you went yesterday," and it seems to me profoundly true. I have been along the same cow-path beside the swamp, I suppose, perhaps two or three thousand times; and I have yet to travel that path without finding something that I have never seen before—this particular formation of rock, this little witch-hazel sapling, this new nest of a red-eyed vireo. The cow-path is one sort of place on a fine day, and altogether another sort of place when it is raining; and it is not the same path in spring that it is in summer, or in autumn that it is in winter. It is a dozen paths, a thousand paths, a million paths . . . as many paths as there are days in the week, or hours in the day, or minutes in the hour. As with the cow-path, so with every other part and particle of these hundred and twenty-five acres. The crows in the hemlock grove this morning

are not doing the same things as the crows that were gathered there yesterday. This raccoon that I met on the wood-road last night was an altogether different raccoon—a *new* raccoon, under the sun or the moon—from any raccoon that I have met before and had a chance to watch and wonder about. Everything changes, perpetually, and since this is a small world I am able to see most of it happening. I have a seat down front, so to speak, in this particular theater of the world of Nature. I do not need any powerful binoculars, nor do I need to read the opinion of the writers in tomorrow's newspapers to find out what I am supposed to have seen. I have seen it. The thing takes place under my nose and under my eyes. Reality runs across my boot in the shape of a white-footed mouse. The poetry of earth sounds



The old bridge across the creek is one of Alan Devoe's favorite places from which to contemplate his world.

directly in my ear. Fact lies immediately available to me, under my hand.

So I say that a small world is a perpetual excitement and reward. Also, for a naturalist, it is a fine and continuous corrective. I think, for instance, of the matter of philosophy and the matter of animal psychology.

What a fearful lot of windy guff we can perpetrate when we start philosophizing in an uncorrected way! We can think up darkly dramatic philosophies about how cold and chaotic and meaningless the universe is, and how helpless and hapless we are in it, and what a tragedy life is for all the creatures here below. We can go on like that practically endlessly; but not if we live in a little world of a hundred and twenty-five acres of woods and fields and brook. Nature insistently nudges us and pulls us up. I go out, all gloom and all philosophical nonsense, into the forty-acre meadow, and there I find a buck deer that has tried to jump a fence and has got a cedar post stabbed into his belly. And what is he doing? Placidly cropping grass. A whole pathetic fallacy about the psychology and suffering of animals goes glimmering, and a fog of philosophical nonsense is burned away by the blaze of immediate reality. I go out in a February blizzard, turning over in my mind something I have just been reading about how brutally cruel the world is (in producing, for example, blizzards), and all of a sudden Nature has dug me sharply in the ribs and aroused me to the possibly unphilosophical but bone-true fact that I am *enjoying* myself. Philosophical posturing cannot survive in a one hundred and twenty-five acre world. It needs the big world, the whole wide world, to flourish in, all theory and fancy. Hereabouts it is always being stopped by the song of a chickadee or spoiled by some chipper grouse up in the hemlock woods, or otherwise ruined.

In the matter of animal psychology, a world of a hundred and twenty-five acres is wonderfully curative of theorizings and of "textbook-ism", by which term I mean the tendency to accept beliefs and disbeliefs about animals simply on the strength of what is written in books about them.



The brook-pool where the great blue herons come to fish, and the spring in the hemlock woods where the deer come to drink are ever-different parts of Alan Devoe's world of small but varied acres.



The libraries are loaded with the works of "experts", all telling us confidently what woodchucks do or do not do, and why they do or do not. The "last word" about the behaviors and minds of skunks or crows or chipmunks or kingfishers is constantly being discovered in a laboratory or proclaimed in a textbook.

But all these "last words" have a way of coming to seem only partial discoveries and feeble surmises when the living animal is met and known intimately in the fullness of its living personality.

What exactly is the content-of-consciousness of my old 'coon, who lives in the hollow hickory up along the wood-road? I do not know, and I do not suppose I ever shall, entirely. But this I know: that no formal little textbook-truth about "instinct" and "conditioned reflexes" can contain the living reality. The consciousness in a 'coon is not the consciousness in a man; no. Of course it is not. But in its own 'coon way it has its own share of the light that lights our own minds and spirits. We are all in a brotherhood, psychic as well as physical. Mind flickers here dimly and there flashes brightly; it is a long way from the consciousness of one of my creek tadpoles to the consciousness of Dr. Einstein. But it is all one mind. The many, as the mystics put it, are all sharers in the One. When-

ever I forget it, I have only to step outside my door into my small world and I am reproved and corrected by the first gartersnake I meet on the path, or the first crow that goes sailing over my head with a piece of dry bread in his beak on his way to the brook to soften it.

Well, I say that a world of a hundred and twenty-five acres is a very good world, and plenty big enough, and full of excellences.

I say there is not anything dull about it, or meager, and that a home-acre naturalist has his great rewards. It has been fun adding them up. Now, I think, I will go out and see what is happening along the cow-path that winds beside the swamp.

Something always is. A rabbit encounter perhaps? Some tracks to be discovered and deciphered in the dark mud, in that spot where the cow-path dips through a little hollow that is all ferns and jack-in-

The part of Alan Devoe's "living laboratory" where, in winter, he has studied otters.



the-pulpits? Or perhaps I may meet my red fox, who patrols this path almost as faithfully as I do, and whose life-way has been intimately under my eye in all seasons and hours for many a year. Once, I remember, he caught a goose; and when I met him he was carrying it slung over his shoulder, in the fashion of a man carrying a heavy sack. Another time. . . .

A Seed

A seed
Is concentrated
Memory—



By LOUISE MAYERS MEREDITH

The life it knew
Springs into
The life it remembers.



Thoughts from the Backwoods

By OSCAR OSTLUND

THE pattern of dogma is a neatly shaped canal. The pattern of Truth is water trickling over ledges, tumbling over rocks—the unpolluted mountain stream.

The course of evolution indicates an end in view unpicturably beyond the light, either of doctrinaire theology or materialistic science that have a range of light in time and space on the order of a flickering pine torch in a wilderness of timber. In lighting up a tiny spot, the torch accentuates the vastness of the dark.

What people believe, or disbelieve (the cause of endless argument pro and con), does it not center to a great extent on the blah-blah of equivocal symbols and on word-built propositions, narrow, incomplete? Is not such battling over word-signs like the swirling excitement of shallow water, agitated at its outer fringe by contact with the river, which glides serenely past the local disturbance?

From every wall of words that men would build around it, Truth, unconfined, will find an opening from which it will protrude, like a living thing in search of light; a plant whose free vines will spread out on the structure of stone to give it a semblance of life.

In the largely unexplored domain of mind and

man, is there not irreducibly more than any fact that can be summed up in a statement?

Is not God a fact-in-living that is trying always (and sometimes succeeding) in expressing itself through our mortal lives?

Can the historian find any coherent element in the story of mankind if he omits the element of God?

Can any philosophy or ideology uphold the truth about God or human society unless that truth can be made manifest in the individual life?

Before the light of a life can be shed abroad for all to see, must it not first be kindled in the quiet interior of the individual human soul?

Can any man be a good socialist if he lacks the integrity that identifies the fiber of the self-reliant individual?

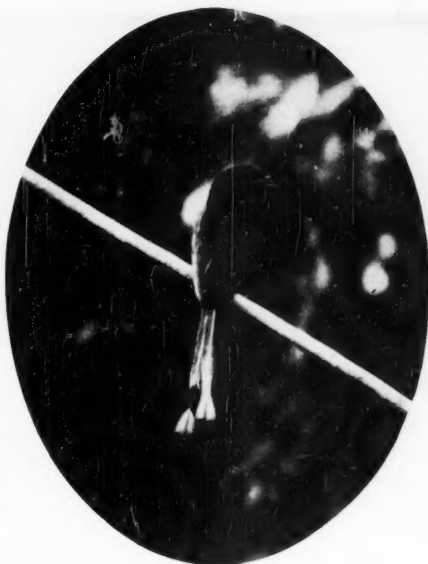
Is there in the human individual a domain more significant than that heritage and creative background in him which he is constantly forgetting?

Who can express himself well unless he also listens well to his fellow beings, and to every form of life that has a voice?

MOTMOTS are among the few feathered creatures that use their bills to trim or "improve" their plumage. In the art of self-adornment, they doubtless anticipated mankind by thousands of years. Yet they have little need of such "beauty parlor" treatment, for even with their feathers as they grow from the body they would hold a high rank among the world's loveliest birds.

The motmots form a small family of about eight species restricted to tropical America, exclusive of the West Indies. Their nearest relatives are the kingfishers—a great, nearly cosmopolitan family—and the charming little red-throated green todies of the Greater Antilles. Although in superficial appearance and habits motmots bear slight resemblance to the single kind of kingfisher familiar to most North Americans, their similarity to some of the numerous forest-dwelling kingfishers of the Old World Tropics is greater; and in their mode of nesting in burrows the two families show close agreement. Like kingfishers, motmots have three toes directed forward, as in the song birds, but with the difference that the outer toe is joined to the middle one for much of its length. The motmot's bill, in some species decidedly broad and flat, usually distinctly downcurved at the end, is hardly longer than the head, and differs strikingly from the long, straight bill of the kingfishers. The cutting edges

At the age of 26 days the turquoise-browed motmot wore the colors of its parents, but its tail feathers are still short and have not yet been trimmed.



A broad-billed motmot. The right of the long, central tail feathers is not yet full grown. The trimming of the left feather, however, has been nearly completed.

Motmots-Dandies of the Bird World

By ALEXANDER F. SKUTCH

Photographs by the Author



of both mandibles are serrated or saw-like—coarsely in some species and finely in others—a modification that gives the birds a more secure hold upon their prey. In size motmots range from the little tody-motmot, about six inches long, to the big rufous motmots, which attain a length of twenty inches or more.

The colors of motmots are subdued rather than brilliant, but of shades so delicate and exquisitely blended that their refined beauty surpasses that of many a brighter bird. The upper plumage is predominantly green, varying in different species from parrot-green to olive-green, and the under surface of the body is often rufous or cinnamon. In some motmots the brightest color is the clear blue, or turquoise, that forms a broad band above each eye, or sometimes covers the whole crown. The wings and tail are often partly green and partly blue, and usually there is a tuft of black feathers over each ear and another on the lower foreneck. The sexes always wear the same colors and can not be distinguished by appearance.

An unusual feature of the motmots is the tail, the central feathers of which are, in the typical species, far longer than the lateral ones. As they grow out from their sheaths, the two middle tail feathers of most motmots are more or less narrowed just forward of their rounded tips. In this constricted region the webs or vanes are loosely attached to the feather-shaft,



These twenty-day-old turquoise-browed motmots screamed and tried to bite when the author removed them from their burrow to take their pictures. Although now clothed with feathers, they could hardly fly.

so that they readily break off as the bird passes its tail feathers through its serrated bill in preening. This leaves, at the end of the tail, a slender, naked stalk terminated by a roundish or oval expanse of web; the terminal portion of the tail comes to resemble a tennis racquet, or a ping-pong racquet, in miniature. In the elusive little tody-motmot, *Hylomanes momotula*, of the lowland forests of Central America, the middle tail feathers have at all times continuous webs and resemble those of more ordinary birds; and the same is true of the blue-throated green motmot, *Aspatha gularis*, which is an anomaly in a heat-loving family and braves the cold, thin air of the high mountains of Guatemala and Chiapas.

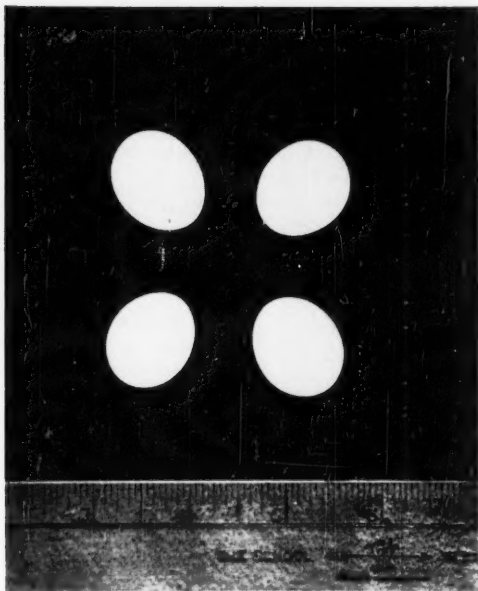
Motmots do not flock, but at least some of the species, including the blue-throated green motmot and the blue-diademed motmot, *Momotus momota*, live in pairs throughout the year. Their habit of resting quietly amid the foliage, often in the deepest shade of forest or thicket, makes these birds of subdued coloration extremely difficult to detect with the eyes. The blue-throated green motmot, although by no means rare amid the oak forests in parts of the Guatemalan highlands, is one of the most elusive birds I have ever studied. This habitual immobility, joined, in some of the species that have been less persecuted, with a degree of confidence in man—which all too often he fails to deserve—has earned for some of the motmots the name *pájaro bobo* or “stupid bird.”

Stupid or not, the motmot has extraordinarily keen eyesight, and when he spies something that promises to repay the effort he darts with surprising suddenness and speed to pluck the morsel from the air, the foliage, or the ground. Then, usually without having alighted at the end of his dart, he returns to his perch with his victim and, if it struggles, knocks it loudly against the branch until it becomes quiescent and is ready to be gulped down. The motmots' food consists of caterpillars, beetles, butterflies and other insects, spiders, lizards, worms and rarely a berry. I have sometimes been amazed by the distance at which a

motmot could detect a green caterpillar resting inconspicuously on a green leaf. But brilliant butterflies, winging swiftly past, also attract the hungry motmot, which easily overtakes them in the air. The larger and more spectacular butterflies are as a rule not relished by birds, which take little interest in them. Motmots, and dainty, glittering jacamars, are the chief butterfly-catchers among the birds of tropical America.

While perching, the motmots have a habit of swinging their tails from side to side, slowly, like a long pendulum. Or they may hold them for a while at the end of a sideways swing, tilted, like a pendulum defying the earth's gravitational pull. In their frequent about-faces while perching, their treatment of the long tail is delightful to behold. They lift it up and over the branch with an inimitable flourish, as though proud of this decorative appendage so different from that of any of their feathered neighbors, and careful not to rub and fray it against the bough. Even the blue-throated green motmot manages its untrimmied tail in this graceful fashion. Of the motmots I know, the most beautiful is the turquoise-browed motmot, *Eumomota superciliosa*, of northern Central America and southern Mexico. A large part of its surpassing grace consists in the more than usual length of the naked portion of the shaft of each of the middle tail feathers, which are exceptionally light and airy in appearance.

The utterances of motmots as a family are most varied. Like the peacock, that loveliest of motmots, the turquoise-browed, has a voice not in keeping with its elegant appearance. Its deep, throaty *cawnak cawaak*, seeming to be uttered with a full mouth, has in parts of Guatemala earned this bird the expressive designation of *toro voz*—“bull voice.” The broad-billed motmot, *Electron platyrhynchus*, has a similarly deep, dry and lusterless call—a full-toned *cuaa cuaa*. The widespread blue-diademed motmot voices a frog-like *hoot hoot* or *coot coot*, and other sounds somewhat weird and ghostly as they emanate from the



A set of four eggs of the turquoise-browed motmot temporarily taken from a burrow in Honduras. These eggs are a pure white.

deep shade of the forest's edge in the morning or evening twilight—for motmots are among the earliest of the purely diurnal birds to become active and the latest to retire at nightfall. This mystifying, ghostly, un-bird-like quality of voice is far more pronounced in the great rufous motmot, *Baryphthengus martii*. In the high rain-forest on Barro Colorado Island in the Panama Canal Zone, the call of this giant among motmots is one of the common dawn sounds of the dry season. The deep, muffled hoots pervade the slowly brightening forest, but rarely indeed is their author glimpsed amidst the clouds of foliage overhead.

Most melodious of the seven kinds of motmots that I have heard is the blue-throated green. As soon as they dart out of the long burrow in roadside bank, or wall of deep ravine, where they have slept together through the cold highland night, male and female lift their voices in unison to greet the dawn. A deliciously mellow piping, full, round and clear, arises from the birds, unseen amidst the still dusky foliage, and undulates afar over frost-whitened fields and through the silent oak woods in the dim crepuscular light. These melodious notes earn for the blue-throated green motmot a place beside the tinamous as one of the most gifted vocalists among feathered creatures that are not true song-birds.

It is believed by ornithologists that motmots originated in the area comprising southern Mexico and northern Central America, where today they are most abundant in kinds and apparently also as individuals.

FOR FEBRUARY, 1949



A fledgling blue-throated green motmot, about five weeks old. A Guatemalan Indian boy found the bird and brought it to the author.

In the course of a good deal of bird-watching on both sides of the Andes in Peru and Ecuador, I saw not a single motmot. On my farm in the Térraba Valley in southern Costa Rica there is only one kind of motmot, the blue-diademed, which I often hear at my house at dawn, and frequently meet while riding my horse along roads bordered by woodland, especially in the early morning and late afternoon, when these birds most often venture forth from the depths of the forest or thicket where they lurk. But one must go to Guatemala or southern Mexico, especially in the more arid regions, to find motmots really plentiful. In the semi-desert middle reaches of the Motagua Valley in the former country, turquoise-browed and chestnut-headed motmots dwell among cactuses, prickly-pears and low, thorny trees that provide slight concealment. Here they are among the abundant birds of the region; one cannot miss them as he walks along the dusty roads between the forbidding cactus hedges. The walls of ravines, and rises of the terraces on the barren hillsides, are penetrated by innumerable nesting burrows, which appear to have been made by these two species of motmots.

Motmots dig their burrows into the banks beside streams, roads and railroad cuts, and sometimes, also, they nest in caves or crannies in the sides of sink-holes in limestone formations. I have watched both turquoise-browed motmots and blue-throated green motmots excavate their tunnels, and in both instances the work was done by male and female taking turns. Neither member of the pair works unless the mate

waits close by. The birds loosen the earth with their stout bills and push it from the burrow with their feet. This last is accomplished almost entirely as they enter to resume work, when with vigorous alternating kicks they throw behind them two parallel, intermittent jets of loose material, which at first spurt out well beyond the mouth of the tunnel, but follow the bird inward and soon pass from the watcher's view. Thus each time a motmot visits the head of excavation it gradually shifts outward the earth previously loosened. The pair of blue-throated green motmots that I watched while they dug alternated in shifts lasting from three to twelve minutes and I could detect no inequality in the parts taken by the male and female, which, indeed, I could not distinguish.

But the situation was somewhat different with the turquoise-browed motmots that I watched dig their burrow into the bank of a lowland stream in Honduras. One member of the pair, which I recognized, temporarily at least, by a spot of dust on its plumage, or a disarranged feather, seemed far more eager to have its mate work than to toil in the burrow itself. When its turn came it would fly from the willow tree in which they rested down to the bank, where it would peck with its bill or scratch with its feet at the mouth of the burrow, or at a point near by, then look around to see whether the mate was paying attention, scratch and peck again, then fly back beside its partner in the willow tree without having done any real work. This wile often had the desired effect, and the mate would then enter the burrow for another spell of honest toil. Since the bird that was more eager to see his mate work than to work himself sometimes gave a caterpillar or similar morsel to the other, I surmised that it was the male of the pair.

In the loose, sandy soil of lowland stream banks the burrows of the turquoise-browed motmot are generally from forty inches to five feet, or rarely as much as eight feet, in length. As a rule they are nearly straight, curving gently to right or left just enough to make it impossible to see the enlarged chamber at the inner end, when looking in from the front with the aid of an electric torch. When studying these burrows, I found it easy to estimate the position of the end, and prepared them for future observations by sinking from the surface at the top of the bank a shaft that met the side or back of the chamber, into

which I made an opening wide enough to admit my hand. This was closed between visits with a board or stone, and the shaft covered over. But no matter how slight the alterations I made, the motmots would invariably desert if I disturbed their burrow before the eggs had been laid and the incubation well begun. The *pájaro bobos* were by no means so obtuse as the name implies.

Burrows of the blue-throated green motmots, dug into the hard earthen banks of mountain roads passing through the oak forests, were exceedingly crooked,

often with several twists or sharp turns where the birds bumped into unyielding roots or stones while they tunneled. In length they ranged from about five to six feet. To locate the end of one of these burrows in advance of digging was largely guesswork, and in preparing them for study I frequently uncovered, while groping for the back of the chamber, portions of the entrance tunnel, or even the nest-chamber itself. Then it became necessary to roof over the exposed parts with pieces of wood before I could fill in the earth above them. But each pair of these highland mot-

mots had been using their burrow as a dormitory for many months before I opened it in March, and had become so greatly attached to it that they did not desert in spite of my extensive remodelling alterations many times greater than would be tolerated by the turquoise-browed motmots, which dig their burrows in the spring just before they lay and do not use them as dormitories.

A pair of blue-diademed motmots, which used as the starting-point of their excavation what was probably the burrow of some mammal near the foot of a steep, rather bare slope covered with tall bushes, made a sharp turn, of about 45 degrees, about midway the length of their 65-inch-long tunnel. I have known this species to dig its burrow also in the vertical wall of clay, more than head-high, lifted from the ground by the root system of a great forest tree that had fallen in a windstorm. The blue-diademed motmots remain paired throughout the year, and may begin in October or November to dig the burrows, which they will use for breeding the following March. They do not, like the blue-throated green motmots, employ these burrows as dormitories; but the early beginning of excavation forms an approach to the system followed by the high- (Continued on page 100)

In Memory of John Muir, Naturalist

By ADELAIDE COKER

Today I saw a country I knew well;
But one that I had never truly seen.
A country where high mountains race pell-mell,
To pierce the vaulted sky that forms a screen
Between the planet Earth and Heaven's throne;
A country where the thund'rous waterfalls
Are heard forever, as an undertone
To symphonies of rain, wind, and bird call's.
Ah, yes, I saw this man's beloved mountains,
And listened to their songs from which his prose
Was written; but more, I saw the marble fountains
Of wisdom spraying Nature's fragrant rose:
And all because his keen unspotted sight
Led me within the arc of beauty's light.

"Admiral" was an Alaskan brown bear whose early life was spent suffering abuse at the hands of the hangers-on at a frontier saloon. The bear learned what kindness was through the author, and never forgot his friend when he came to visit.



Odd Experiences with Animals

By J. ALDEN LORING

Photographs from N. Y. Zoological Society

TO MOST people, myself included, the common house rat is repulsive, but not so with our wild species, of which there are many. Take, for instance, the bushy-tailed wood-rat or "pack rat," that lives in the Rockies, as well as in suitable places in the lowlands, where it often selects buildings, deserted or occupied. This is a creature with soft, silky fur, bright eyes, large round ears and a bushy tail. Its true nest is rarely found, but its rubbish piles, erroneously called nests, are common.

These "nests" are evidently built to put in time, and are a mixture of nearly everything you can think of, often piled three feet high. They consist of sticks, small stones, dried cow dung, the skulls of birds and small mammals and any trinkets that can be picked up about the house. I once found one containing a golden eagle's skull.

It is the general opinion among westerners that the animals always leave something to replace what they have stolen, but I believe they merely drop the article they are carrying in preference for one more to their liking.

A woman, visiting at a ranch where I was stopping, before retiring, placed her false teeth on a chair by her bedside. In the morning they were missing and in their place was a spool of thread. Thinking that

During a full lifetime, the late J. Alden Loring traveled widely throughout the world as a field naturalist and collector for the U. S. Biological Survey, for museums and scientific institutions. He made two African trips with Theodore Roosevelt. Many were his experiences with wildlife, some of which are recorded in this posthumous article.

some member of the family had played a joke on her, she did not mention her loss until obliged to do so at breakfast time. When she mentioned the spool, the head of the family, well versed in the habits of pack-rats, and knowing that one inhabited the building, "smelt a mouse." The missing teeth were discovered in a pack-rat's "house," which, in

this case, was under the floor.

For a week I lived in an abandoned log cabin in the Cochetopa Mountains near Saguache, Colorado. The latest occupants of the building had removed several logs from one end of the roof for firewood, leaving quite an aperture. I noticed a wood-rat's rubbish pile on a shelf in one corner of the one-room building.

The first night nothing happened, but on the second night I heard the rat enter the cabin through the roof and patter across the floor. It jumped into the large wash pan on the floor by my side, raced round and round in it for several seconds, then jumped out. Coming over to me, it took the lobe of my ear in its teeth, gently bit it, then ran over my body and out through the cabin roof.

On another occasion, while traveling through Wyoming with pack and saddle horses, I came to a deserted cabin about camping time. Unpacking my horses and turning them loose, I unrolled my blankets



Bessie was a coyote that had apparently been raised as a pet. She learned to trust and understand the author, and even to have enough confidence in him to let him take one of her pups to display to admiring visitors.

on the ground about thirty feet from the cabin. Before turning in, I took my belongings from my pocket, including my pocketbook, and placed them in my hat on the ground close to my head.

It was a cold night and my blankets were not too heavy, so I slept in my clothes. In the middle of the night I awakened to see a wood-rat, its front feet on the rim of my hat, intently gazing at my possessions. A few minutes more and I undoubtedly would have been robbed, probably of my pocketbook.

A white trader, who had a post on the site of the old Hudson's Bay trading post, Jasper House, in Alberta, told me a story in which a pack-rat was the villain of the piece. Two miners, who had a cabin near-by, were washing gold from the sands of Athabaska River. One discovered that his poke of gold was missing and accused the other of stealing it. The result was that they drew a mark through the center of their one room. All that winter each kept on his side of the line, and they never spoke to each other. Eventually the missing poke was found in a wood-rat's rubbish pile under the floor.

At Fort McMurray, on the Athabaska River, I was waiting, with two other naturalists, for the ice to go out of the river so that we could descend by canoes to Lake Athabaska to spend the summer studying the nesting habits of the waterfowl. Seated at the trunk of a large tree I watched the antics of what I took to be a family of chickarees, closely related to our eastern red squirrels. Scampering about and chasing each other, they were having a great time. Giving a few squeaks with my lips, which, I had discovered, often entices inquisitive birds and mammals within close range, I awaited the result. Over they came and ran up the trunk of a tree three feet away, scolding me at a great rate. But, as I remained motionless, one soon

jumped to my shoulder, then another and another, until the whole family were racing over my body as though I was part of the scenery. When tired of this, they returned to their original playground.

For a number of years I was Curator of Mammals at the New York Zoological Park in the Bronx. On passing the prairie dogs' inclosure one morning, I noticed two of these rodents engaged in a fierce fight. Finally one of them broke away and ducked into his burrow. The other, chattering and scolding, started loosening the dirt that every prairie dog piles about its burrow to prevent rain-water entering and flooding it. The animal pushed the dirt into the burrow and tamped it down with his nose. He completely filled the burrow, level with the top, then left. If he thought he had blocked his enemy in for good he was mistaken, for an hour later, when I visited the inclosure out of curiosity, the other "dog" had dug itself out.

By ten o'clock, when the park gates were open to the public, the keepers were supposed to have finished their work of cleaning the installations and to be in uniform. It was then that I made my round of inspection to see that the work was properly done and to get any report on animals that might not be in perfect health. I never passed an inclosure containing a friendly animal which had learned when to expect me that I did not stop and visit with it.

In one of the wolf dens was a coyote that had evidently been raised from puppyhood and was far more sociable than many domestic dogs. One morning, however, she refused to play with me and acted queerly. Finally she entered the shelter box and emerged with a puppy in her mouth. Evidently it had just been born. "Well, well, well!" I exclaimed, "so Bessie has babies, that's a nice baby, a pretty baby, you should be proud of that baby." And so it went, day after day, until I had mentioned the word "baby" so often that

Baboons are inquisitive animals. The author found a quintet of them interestedly investigating his clothes, discarded when he went bathing in an African pool. He always wondered what might have happened to his raiment had he not appeared.

evidently she connected it with her puppies. At any rate, one Sunday afternoon when the guard rail around the wolf dens was thronged with visitors, and I had been petting Bessie, I chanced to remark to a little girl: "She has the cutest babies you ever saw." "Oh, I wish I could see one," she replied. "Go get one of your babies, Bessie, get one of your babies," I said, and, after a pause, she turned, entered the shelter box and emerged with a puppy in her mouth. I cupped my hands through the bars and as she came over, "I have it. I won't drop it. Let me have it," I urged. She hesitated several seconds, but finally gave me the pup. I walked down the line of visitors, past the two adjoining dens, to let the children see the baby. Bessie stood on her hind feet, her front paws resting on the iron bars, and watched me, until I came back and handed it to her to return to the box. Time and again afterward, at my request, she repeated the performance.

I was sent to Alaska to purchase any brown bear cubs I might find in captivity, and also to contact someone who would assume such duty in the future. While black bears were common, nearly every saloon having one staked out back, I found only one brown bear cub, which I judged to be about six months old. It was being horribly abused by the drunks who drove it about, lashing it with a pole to hear it bawl. They would also offer it food and then jerk it away. The bear had bitten several drunks on the legs, so, since it was fond of beer and would sit up on its haunches and drink from a bottle held in its paws, in an almost human manner, they gave it knockout drops. When it became unconscious, these people knocked out the cub's milk teeth with a hammer. I bought the bear for fifty dollars, had a shipping cage made, and, after much persuasion, managed to entice it into the box.

By kind treatment I managed to gain the friendship of Admiral, as I called him. By the time I reached Haines Mission, and boarded the vessel for Seattle, I could lead him about the deck on a leash and the passengers would feed him tidbits. At Seattle, I shipped him by express to the Park and stopped off in Buffalo to visit. Admiral reached the Park before I did. When I arrived I climbed over the guard rail and called, "Hello, Admiral." He came over and licked my hand so I went inside, and, much to the enjoyment of the visitors, we put on a fine boxing bout, the first of many thereafter.

After I left the Park, I managed to get down to New York several times a year for three years, and always went to renew my acquaintance with both my four-footed and biped friends. Admiral always recognized me and showed his affection in the usual way.



Then there was a lapse of four years before I again visited the Park. In the meantime Admiral had reached maturity. He was a mammoth animal, weighing some eight hundred pounds. He was sprawled out on the concrete at the back of the den when I climbed over the guard rail and said, "Hello, Admiral, do you still recognize me?" Slowly he got to his feet, shuffled over, and, standing on his hind feet, reached through the bars with his "arms", and drew me close to him to lick my face. I patted his head and scratched him back of the ears, an attention that many animals enjoy.

At that moment a new keeper hove into sight. Taking in the situation, he shouted, "Get away from there, that bear will kill you!" The keeper grabbed a long iron bar and rushed toward me. "Don't prod him, he's a friend of mine, he won't hurt me," I replied. He stood there amazed, the bar still in his hands, ready for instant use. So I told him the story. The keeper shook his head: "That's something! I wouldn't believe it if I hadn't seen it. You know, that bear is the ugliest one of all. I never clean his cage without first getting him into the next den." Ugly though he might have been to some, Admiral had not forgotten the man who had rescued him from his Alaskan tormentors, given him good living quarters, a big swimming pool—in which he spent much of his time—good food, and had always treated him kindly.

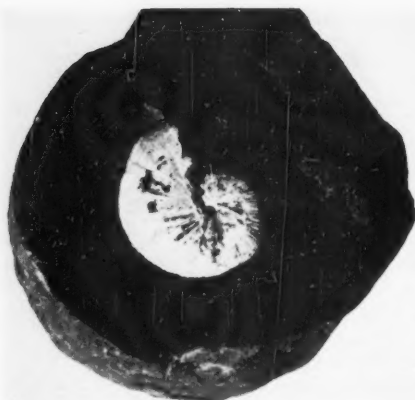
Yet such a case is not so strange. Few wild animals live to be over twenty years, and, at the age of three months, in memory, intelligence and ability to care for itself, a wild animal is at least five years in advance of the human child. (Continued on page 98)

ARE you apprehensive and anxious about the peace; fearful because the frightfulness of modern man is so much more devastating than was that of his ancient brother; dismayed to see the mule's kick so put to shame by the appalling and explosive wallop of the atom? If you would tranquillize your befuddled mind, take the poet's advice and "Go forth under the open sky, and list to Nature's teachings." Taking such advice has calmed many minds.

The appeal of Nature is perhaps the largest single factor that brings peaceful enjoyment to the American vacationist. Nowhere else in the world do people travel so widely on vacation trips as in our country; nowhere else are there so many automobiles to make travel easy and rapid; and nowhere else is the totality of physical reality so varied and attractive. Broadly speaking, Nature is not only as wide as the world, but as long as history.

Fossils reveal much of the past experiences of life, and make it much more easily and fully understandable. Impressions or traces of animal and plant life of past geological ages can be readily found in most of our States. Areas where interesting and valuable material can be found are so widespread that it is easy to do collecting without making extensive journeys. Nearly everyone can be a modern Marco Polo in his own right. Even on a trip short in miles, you can cover a length of time never once dreamed of by the redoubtable Marco. On such a short trip you can enhance your vacation with souvenirs of the dawn of time. But it is only fair to warn you that you will find yourself so intrigued by the lights and shadows that prevail in ancient fossil domains that you will wish to extend your adventure as far as possible. Perhaps you will collect for yourself, or will find it just as interesting to present your specimens to the nearest museum. Either way, it is fun.

Most fossil areas have at least one local character who is interested in making collections. Such a collector is unfailingly a person of generous impulses,



An ammonite belonging to an extinct order of ancient cephalopods. This specimen slumbered millions of years imbedded in stone before the collector's hammer revealed it.

Notes on a Happy Hobby

By PETER T. DONDLINGER

be he a college professor or a range rider. Apparently fossil collecting engenders a remarkable spirit of tolerance and benevolence, a sort of horse and buggy altruism that thrives best in rural habitats where the horse has his feet in the soil. Finding this local collector is the most important preliminary to finding fossils, if one is a stranger with limited time.

One excellent place to collect is at the former

strip coal mines near the small village of Coal City, Illinois, where fossil leaves of ancient seed ferns are numerous. These are plants from the Coal Measures of Pennsylvania Age, and the plants flourished from 250 to 220 million years ago. The overburden of soil and clay was removed from the coal by giant steam shovels and deposited alongside as small hillocks. Vegetation cannot subsist on those piles of clay, which the rains are gradually washing away, making contiguous fields unproductive. Nature has done her best to mitigate earth's sorrow over the resulting pockmarks on her face by filling with water the giant excavations that were left after the coal had been removed. But the entire area of ponds and surrounding hillocks is now a ruin known as "The Spoils."

You will find that Peter Henrietta is the collector who has become expert in that locality. Fossils are not mousetraps, however, and you may have to make several inquiries before you can find out where he lives. If it is after working hours he will probably be glad to go to "The Spoils" with you to collect. Indeed, he may even invite you to take as gifts some specimens that he has already collected. The only fear that you need have is that your modesty in taking may not match his native generosity in giving.

In an unknown manner these seed fern leaves became encased in limestones that the rain now washes out of the clay. Some stones approximate the shape and size of a finger, others the flat of a hand. A few light hammer blows break the stones in half lengthwise, some revealing an imprint of a fossil leaf on the inside of each half. A day at this spot can hardly fail

to produce many fairly good specimens.

If you are driving farther west, you should stop at Independence, Iowa, where the limestone being quarried yields many fossils. There you may secure specimens of fossil sponges, corals, and various kinds of brachiopods, or prehistoric shellfish, which once were numerous but now are represented by relatively few species, such as oysters and clams. This limestone is found in strata thousands of miles in extent, and wrapped about the earth like great gray sheets under the blanket of topsoil. This is frequently a productive source of ancient marine fossils, some of which lived several hundred million years ago.

These strata at Independence, Iowa, are the same as those that come to the surface on the banks of the Missouri River in North Dakota, where they are known as the Fox Hills Formation. This formation you may, for example, explore at Linton, North Dakota. There is a hotel where you can stay over night. Attorney Charles Coventry, who lives there, will be glad to give you information about the fossil fields, and he may even act as a guide for you on a little excursion. The material that may be picked up on the surface of the ground is so badly weathered, however, that you will have to do some digging if you want good specimens.

For an entirely different type of fossil, you might now go to the northwestern corner of South Dakota, at Buffalo. George Hett lives at Buffalo and will probably be glad to act as a guide for you. He is a retired rancher and owns a 7000-acre ranch, known as the "See Moore Ranch", about fifteen miles out of Buffalo. From the ranch house you turn off the road and drive across the open prairie to the foot of one end of a row of seven buttes that stand on the ranch. Parking the car, you will work around the bases of the buttes for a distance of about two miles. In the sandstone embankments, between the layers of sandstone formed some twenty million years ago, there are fossil imprints



A fossil ant preserved in stone from the Miocene Florissant formation.

A fossil leaf from a hardwood tree, probably a poplar, of the Miocene Florissant formation. It is about fifteen million years old.



of leaves of trees that were probably progenitors of some of our modern basswood or linden. The stone is so fragile that it requires great care to secure a leaf of any size. When you drop Mr. Hett off at his house in Buffalo, do not be surprised if the old pioneer dives unceremoniously inside, without giving you any opportunity for farewells. His heart will be full, for doorbells do not often ring in northwestern South Dakota.

If you still have the time and urge to go farther, you may now turn southward. You will probably see small groups of prong-horned an-

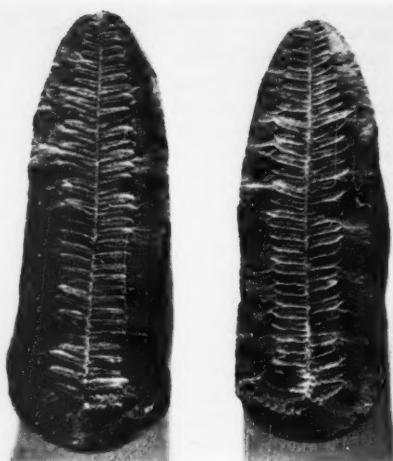
telope in western South Dakota, descendants from the large herds of those animals that still roamed the prairies of Dakota Territory during the early eighties. Your next stop may be at Florissant, Colorado, nearly atop the Great Divide, where you will again find beds of stratified rock, but this time it will be limestone of the Miocene Florissant formation, about fifteen million years old. This rock comes to the surface right along the roadside. It is easy to separate the strata, between which there are imprints of fossil leaves, predominantly of poplar trees. Now and then there are also fossil invertebrates, such as spiders, beetles, ants and dragonflies. Despite the lapse of aeons of forgotten time, the imprints of some of those insects are as perfect as if made by moderns of yesterday.

One of my trips included all of the localities above mentioned. It covered 6000 miles in two weeks, and was concluded at Salina, Ohio, west of Toledo near Sylvania. In another quarry there, deep in the enwrapping sheets of limestone, I found fossil gastropods whose family traditions are carried on in our time by the snails and slugs. Their shells were univalve, and they probably antedated the bivalvular brachiopods that I collected at Independence, Iowa, by millions of years. I also found some fossil trilobites in this quarry, one of a group of arthropods that became extinct, leaving no near relatives, although the horseshoe crab and the lobster may be descended from

Leaves of seed ferns from the Coal Measures of Pennsylvania Age. The two specimens show the opposite sides of one leaf.

uncles of a kind. These trilobites came into being ages prior to the gastropods, but survived long enough to be their contemporaries for ages more before becoming extinct.

Back from my trip with a heavily loaded Buick, I had really been back millions of years; to years during which all of the sites that I had visited were portions of a drab and endless prehistoric, watery waste. Yet it was not merely a waste, for those early waters, wave-worn and tide-tossed, cradled the primitive forms of life through a period that seems all but timeless, without beginning or end. During those long reaches of their history, some of the early denizens of the deep lost the battle, died, and became extinct, while others were successful in surviving and in struggling upward to higher planes of life.



Lupine for Waste Places

By EDWIN F. STEFFEK



OUR native blue lupine, *Lupinus perennis*, is not only one of our most attractive wild flowers, but, contrary to popular belief, it is one of the easiest to propagate. It grows to a height of about two feet and in May or June bears handsome spikes of blue—rarely pink or white—pea-like flowers above its handsome divided foliage.

This lupine is a hardy perennial, thriving in barren fields and sandy waste places from Maine to Minnesota, and south to Florida and Louisiana. It likes full sun or light shade, and, while it will grow in the garden, it is never as satisfactory, or as long-lasting, in a richer, heavier soil than Nature intended. Being a true legume, this plant not only takes nitrogen from the air for its own use, but even leaves some extra in the ground by means of its root nodules.

Three to six seeds are produced in each hairy, bean-like pod some time in July or August. These will germinate readily if sown immediately in a light, sandy soil. Since lupine roots are long and are difficult to transplant, the seeds are better sown in their permanent location. For this same reason the plants are rarely dug up and divided successfully without special care.

While they may tolerate other soils, in the wild the plants are almost invariably found in one of acid nature. Lupine's natural companions are pitch pines, gray birches, wiry grasses, sweetfern, pink ladyslippers, lowbush blueberries and *Viola pedata*, the charming birdsfoot violet.

All in all, this is one of the best plants for the beginner in wildflower conservation to try. Given the proper soil, it will grow well in the garden, the wild garden, or the gravel of a roadside cut. This latter place, incidentally, might well be made the scene of some true conservation. Not only will lupines hide the scars of road construction, and create a spot of beauty, but they will also assist in holding the bank.



Goose Baby-Sitter

By WILLIAM H. MESSENGER

SHADES of John Audubon! Quite a furor was stirred up when a wild male Canada goose took over a brood of thirteen ducklings. Mother Duck stayed with the family but seemed to welcome the gander. Mr. Sapp, Post Forester, owner of the ducks, whose wings are clipped, is particularly amazed because the gander is the only bird whose wings are perfect, which allows him the opportunity of flying away whenever he wishes. He liked Fort George Meade, Maryland.

Truly it was a strange sight to see this stately, colorful bird leading the baby ducks out into the water, and then watch him as he brought up the rear, making certain that no harm would come to any of the brood. When feeding time came he watched with a wary eye and ready bill to drive off any would-be intruders who might seek to take food away from his "family". With a full-time "baby sitter" like this fine fellow, Mother Duck really had a soft snap.



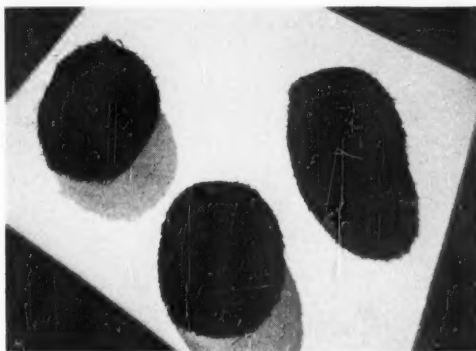
Lake George "Coconuts"

By JAY ROBISON

THESE formations, roughly resembling husked coconuts in size, shape, and color, appear to consist largely of pine and hemlock needles held together by some natural binder. Four of them were found in the clear, shallow water of a secluded, sandy-bottom cove at Stillwater—the summer home of Maurice Hoopes—on Fish Point, near Bolton, on the west shore of Lake George, New York. A study of the cove and its surroundings led me to a quick conclusion that these are probably due entirely to the action of wind and water in the peculiar set of conditions that prevail in this small cove.

Pines and hemlocks are legion among birches, maples, oaks, and other trees that line the cove shore and compose the forest that the cove indents. The cove is nearly circular and about fifty feet in diameter. It is open only to the south, from which direction come the prevailing summer breezes. A number of large rocks spaced across the opening, however, break the force of heavy waves at the entrance. The result is that only gentle waves and ripples reach the cove shore.

Pine and hemlock needles, largely pulverized by the gentle wave action, form a dark brown "sand"



of their own on the light brown silicon sand over part of the cove pond bottom, close to the rock-lined shore. This needle matter constantly shifts back and forth a few inches on the shallow bottom with the gentle rocking motion of each succeeding wave. Rolling back and forth at separate points on this needle-coated bottom were the four soft, spongy "coconuts." Three of the four were brought back to Washington, and investigation reveals that comparable formations of Nature's manufacture have been reported from widely separated places where wind, water and the proper raw materials are available to make them.



Saucy, the bluejay, breakfasts. Sugar is a particularly toothsome item to her. Below, Saucy at the telephone, over which she is wont to chatter, as are many females of the species.

In the Language of Birds

By PAUL H. FLUCK



BY inventing the ladder of evolution, naturalists have tried to draw the animal kingdom to scale with human beings. Some have been criticized for placing *Homo sapiens* upon an exalted pedestal, and arranging the lesser creatures in ascending positions. But this is not quite true, for when the various schemes are examined, every builder of these pyramids has placed the birds atop another pyramid, which has as its base the reptilian kingdom. Birds occupy, in this zoologic setup, a place akin to man's. There they sit, astride their own pyramid, much as we, the greatest of the primates, sit upon our own.

If we accept this zoologic ladder of our own making, we should expect to find, within the bird, the master developments of the reptilian kingdom: the highest intelligence, the best development of limbs and digestion, as well as a highly developed voice. The all-important flight feathers are only the glorified scales of slippery, crawling things that lived in prehistoric swamps. The mellifluous voice of a thrush is only a step removed from the shrill of the "hyla" shrieking in the ditches on a spring evening. In this way, things have been arranged in the filing cabinet of science.

Let us see whether, among the cackling and the warbling voices of the bird world, we can find the rudiments of a language. Let us see if we can recognize, in these varied notes and vocal ejaculations,

Saucy's deformed bill is the result of an injury, and it prevents her living in the wild. Below, Saucy eats in her favorite fashion. Note the door corner. The bluejay did it.



any resemblance to the vocal communications that make it possible for man to occupy his place at the top of the pyramid of primates.

Can a bird speak? Do birds converse? Is there a language of birds?

The first question cannot be simply answered by pointing at a parrot or a magpie, and saying, "Of course they can". Such imitations are far from speech as we know it. Speech must be more than an imitation; it must carry with it the power of representation, and the essence of intelligent understanding of its own meaning. "Polly wants a cracker" can hardly do that.

To learn the speech of birds, their words and their meaning, it would be well to do as we advise those who attempt to master a foreign tongue—"Go live with a foreign family". But it is difficult to live with the birds. Furthermore, it is difficult for birds to live with us. And with the mere passing acquaintance of distance, it is not easy to learn much about the language of birds. We may hear a crow "caw", a mourning dove "coo", or a robin sing, but we learn little about their speech in this way. In fact, we learn so little that we have come to believe that they are quite dumb, and that they have no power of speech at all. Nothing could be farther from the truth.

Although, in some parts of the world, chickens scratch about in the floors of dwellings that are not much more than pig sties, it is hardly possible to simulate such conditions in the United States, if one is not to be visited by a representative from the Board of Health. But it is possible to maintain a small bird within the walls of a modern home if one is willing to submit to certain embarrassments and minor destruction. Fate may some day send an injured bird, or a young, uncared-for fledgling, into your home.

Most of my observations were made from such a bird—Saucy, a tame bluejay, that an injury kept from her normal home in the tree tops. She lives in an ordinary house, where the beautiful spangles of this vivacious creature flash from cellar to attic as she attends to every household duty, for she has the run of the establishment. She sleeps in her master's bed-



room, in an old canary cage, and feeds herself from the table at meal times, when she enters into conversation in her own understandable way. Much worthwhile knowledge has been garnered from this intelligent bird.

To begin with, Saucy knows her name and comes when she is called, just as any dog runs to its master. This, you will say, only proves that she understands our language. And it does. But Saucy does more, she actually speaks, not in nouns, verbs, and adjectives, but in a way, and a language, of her own making; for Saucy arrived in my home as a tailless baby bird that could hardly have acquired bluejay habits under more than very primary conditions. Surprisingly enough, Saucy has learned a sign language, which she intersperses among her vocal calls, and, by means of this combination, she manages to convey quite well what she has to say.

Let us take the simple matter of "Yes" and "No". Saucy can say both of these words, with and without emphasis. Her voice, within my aural range, makes no sound when she answers my questions, but she answers them decisively, and effectually, with the sign language that she knows so well. "No" is simply a matter of flying swiftly away. "No" is not only signified; it is carried out with decision. Ask Saucy if she wants to go to bed, in daylight, then try to coax her near her cage. She may be sitting on it, but the mere mention of the word "bed" will send her flying at top speed into another room, where pursuit is useless as long as the word "bed" is used. But as evening approaches Saucy shows a different feeling toward the same three-letter word. "Bed" is then acceptable; she flies over to her cage, and hops through the door that I hold open. She sits upon her perch, and goes to bed. This is her way of saying "Yes", but she has no bird word for it. "Yes" is altogether an action, just as "No" is an action. This is exactly the way a human infant, a dog, or a "lipsticked" Juliet signifies "Yes" and "No", for compliance and agreement seem to be the most efficient primitive ways to answer verbal questions in the affirmative.

Sign language plays an important part in the language of birds, just as it does in the language of primitive people. Sign language, moreover, is a language. With it we manage, as do the birds, to convey our own ideas to the consciousness of others. With it we speak as deaf mutes speak, but we speak, nevertheless.

I prove a hundred times a day that Saucy understands my language. She answers me by using the sign language that she finds so effective. I tell her that I am going to steal her peanut from under the newspaper, and before I can move a muscle she is



Both the cat and Saucy seem interested in the green leaves from the money plant, and the bluejay is not averse to gathering up such leaves and hiding them in miserly fashion.

on me, tearing and pecking at me with all of her unusual strength. I tell her that I am sorry, and she stops at once. She sits on my finger, twittering soothingly. I tell her that she is a "bad bird" and, like a bad boy, she will sass me from the top of the door. She will even make a pass at my ear, or muss my hair, by way of protest. I tell her to get her "breakfast", and she flies into the kitchen at any time of the day to shovel mouthful after mouthful of sugar down her greedy throat. "Breakfast" and "sugar" are synonymous to Saucy. I ask her for a "button", and if she is in the right mood, and thinks that I intend to do right by her prized button, I get a button, not a peanut, or some other trinket such as she collects by the bushel. I stand on her rug, the woolly hiding place for her treasures, and my heel will bear the marks of her bill for several days. She asks me to move my clumsy feet, in sign language of the most effective kind. So much for the sign language that both Saucy and Sitting Bull have used to advantage.

But how does Saucy ask questions? Perhaps she

wants to attract our attention because we have forgotten, and locked her in the bathroom. She whistles, just as the paper boy whistles to attract our attention on Monday, when he comes to get his money. She has a cheerful, informative whistle to warn us not to step on her in a dark hallway, or otherwise to let us know where she is.

There are times when sign language is inadequate to explain the urgency of her problems, and then Saucy resorts to a variety of different vocal sounds. She chirps a mournful note when she has been forgotten, or when no one has bothered to turn the light on for her. She repeats this dirge-like note, over and over again. It is a sad sound, and Saucy is sad when she makes it.

If you talk to Saucy, tell her nice things such as how pretty she is, or suggest scratching her belly, she will twitter and chirp, fluff her feathers and strut, just like any flattered blonde. If I am in some other room, I can tell that Saucy is being complimented by someone, just by hearing that twittering. Listen to a female starling, or an English sparrow, while the male flits about in flattering and complimentary flight, and you will hear the same twittering that inflates the chest of my bluejay.

Defiance is another matter. Saucy is defiant, as are all bluejays. No bird has a more valiant tradition than the jay; he is the bravest of the brave and the most fearless. Saucy screams in our faces, and returns time after time to attack us if we as much as move one of her precious peanuts, or some other prized possession. She speaks a defiant language if we give her a reason—and a hearing.

Bird happiness is especially vocal. I often wonder if the beautiful songs that we associate with the mating season are not just happy songs, due to the complexion of the weather, the season, and the abundance of the food supply. The length of the day may play an important part in this singing, for on long days a bird has ample time to find its food and play.

Humor plays a part in bird life, as well as that of man. Birds have a genuine sense of humor. Saucy will steal every cracker from a plate, and then return to mock us when we notice that they are missing. She will snatch a diamond ring and fly speedily to some hiding place. Then she will return to watch

us, cackling meaningfully when we demand the priceless heirloom. She will not tell, and she gives us the "Ha Ha" in her own sweet way, for she loves to play a joke. Often, when we enter a room, Saucy will not be in evidence. She has ducked into a corner to hide, and she expects us to look for her. When we do, she will come out of her hiding place, using a series of short bows and whistles that say, "See, you couldn't find me."

When the jay is downright cantankerous, the mere word "Goodbye" will make her change her behavior. If she is stubborn and refuses to perform for her audience, we just say "Goodbye, Saucy", and Saucy will carry out her act, or obey a command. She will let us have a peanut that she has been hiding in her throat, or cough up a "bobby-pin" that straddles her wind pipe. She will let go of anything to prevent us from leaving her alone. "Goodbye" is the word we always use when we lock her up, so "Goodbye" gets results when we use it.

Speaking to a pet bird is practical, and that goes for almost any bird. Animal trainers know the value of speech in training animals, for there is little doubt that speech is better understood by animals than we have ever suspected. Birds may speak a universal language, as well as a specific one. The big green parrot that preens itself in the window next door can interest Saucy, although she cannot duplicate its hooting and cackling. A scream of defiance from the parrot will promptly bring one from Saucy. She reflects the humor and the disposition of her neighbor quite well, although they speak a different bird language. A bluejay, in the forest, can alarm every bird or animal within earshot. It is Nature's warning siren for her hard-pressed creatures.

It is a human failing, and not the fault of birds, if we do not understand them. Their language is simple, for a large part of it is pantomime, and is not wanting in decision or variety. Flight activities, fluttering, swooping, and the whistling of wings, I am sure, may have definite meanings. We should not allow our ignorance of bird language to lower our estimate of bird attainments, any more than we should underestimate the accomplishments of a foreigner speaking to us in his language, the only language he has ever learned, even though we are untutored in it.



Cottonwood

By ALLEN E. WOODALL

A poplar is a poem in the wind,
Endless twinkle of green-silver leaves
Splinters the sunshine into flakes of gold
With the rustle of a thousand airy sheaves

Of light unharvested in heaven's field . . .
A poplar is half of earth and half of sky,
A system of the clouds in changing green,
The spirit of the grass grown thunder-high.

Snow, Winter's Emblem

By E. LAURENCE PALMER

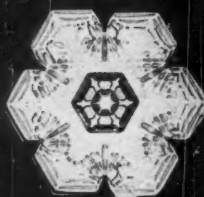
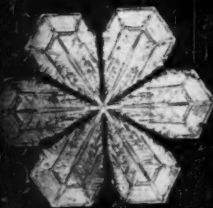
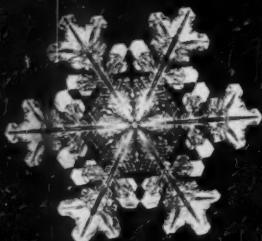
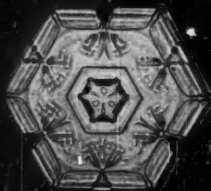
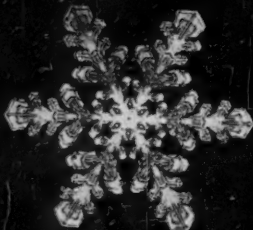
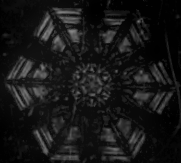
Snowflake Illustrations by U. S. Weather Bureau

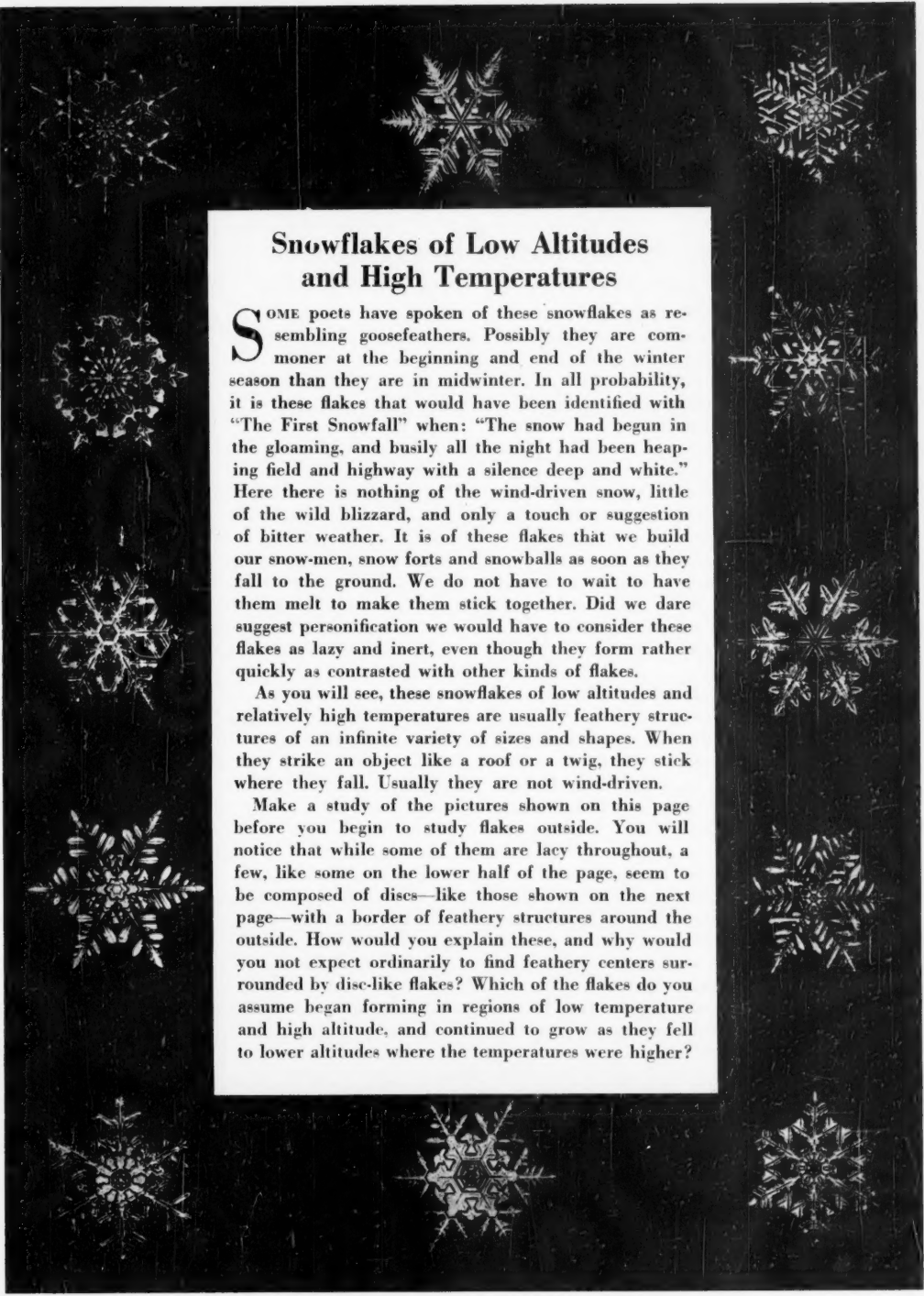
FOR a decade, we have given you special eight-page inserts, in alternate issues, dealing with a wide field of Nature subjects. It is appropriate that, with the beginning of a new decade and a new year, we try something different. Accordingly, this marks the first of a series of four-page articles that will appear with each number of *Nature Magazine*, continuing the series that for so long has been following a more or less common eight-page pattern.

This new series will attempt to serve essentially the same need that was the function of the old, and provide greater continuity. Necessarily, it must deal with smaller units, but these will be selected so that they may be integrated, and in the long run they will cover as much ground, in as much detail, as did the old. This unit on snow is part of a series covering an understanding of snow, ice, frost, clouds and water, two of which will be covered this winter, with the others to follow, probably within the year. We hope that the new series will win the same support as did the old.

Even in our nursery rhymes about such well-known characters as Mary's lamb, snow has been used as a standard of perfection. When we say "her fleece was white as snow", most of us know exactly what is meant, forgetting, of course, how snow looks about a city after a thaw. It is not surprising to find poets and essayists saying that things are as light as snow, as chaste as unshunned snow, as spotless as snow, as silent as snow, as pure as snow, as feathery as new-blown snow, as beautiful as snow, as welcome as snow, and so on almost indefinitely. We find it cursed and praised, used and abused, welcomed and despised. It saves and destroys life, helps and hinders transportation, wears away and holds soil, causes floods and helps maintain steady stream flow. It cools things and keeps other things from becoming too cold. It may cause persons to become lost or may help those who are lost to become oriented. It marks and obliterates trails. It breaks some trees and protects others. It hides and it silhouettes isolated animals. It causes death to those without shelter and provides a superior medium for the construction of a shelter. These are only a few of the many roles played by the stuff, individual units of which appear on this page.

And, on the next two pages, are snowflakes formed under differing conditions. Study these, and then go outdoors on a snowy day and see what you can learn from the flakes that light upon your coat sleeve. See whether you can discover which match the various kinds that are shown here. On the School Page, too, you will find some more suggestions about snow and how to become better acquainted with it. As you get to know it better you will find that you can make some simple classifications and get to be on intimate terms with many of the tiny flakes that go to make up a storm that blankets so much of our country most of the winter, or from time to time during the winter months. Some may wish to try photographing snowflakes, a process that is a challenge to the photographer but a source of great satisfaction when successful.





Snowflakes of Low Altitudes and High Temperatures

SOME poets have spoken of these snowflakes as resembling goosefeathers. Possibly they are commoner at the beginning and end of the winter season than they are in midwinter. In all probability, it is these flakes that would have been identified with "The First Snowfall" when: "The snow had begun in the gloaming, and busily all the night had been heaping field and highway with a silence deep and white." Here there is nothing of the wind-driven snow, little of the wild blizzard, and only a touch or suggestion of bitter weather. It is of these flakes that we build our snow-men, snow forts and snowballs as soon as they fall to the ground. We do not have to wait to have them melt to make them stick together. Did we dare suggest personification we would have to consider these flakes as lazy and inert, even though they form rather quickly as contrasted with other kinds of flakes.

As you will see, these snowflakes of low altitudes and relatively high temperatures are usually feathery structures of an infinite variety of sizes and shapes. When they strike an object like a roof or a twig, they stick where they fall. Usually they are not wind-driven.

Make a study of the pictures shown on this page before you begin to study flakes outside. You will notice that while some of them are lacy throughout, a few, like some on the lower half of the page, seem to be composed of discs—like those shown on the next page—with a border of feathery structures around the outside. How would you explain these, and why would you not expect ordinarily to find feathery centers surrounded by disc-like flakes? Which of the flakes do you assume began forming in regions of low temperature and high altitude, and continued to grow as they fell to lower altitudes where the temperatures were higher?

Snowflakes of High Altitudes and Low Temperatures

ONE of the greatest weaknesses in popular science writing centers around attempted over-simplification. It is easier to show you pictures like those on this page, and to tell you that the subjects come from high altitudes, under low temperature conditions, than it is to explain the facts of the case. Some of the crystals shown on this page may well have been formed at lower altitudes than some shown on the preceding page. It is safer to suggest the conditions under which these types of flakes were probably formed than to attempt to say just where and when and how.

Most of the flakes shown on the preceding page probably formed rapidly in an atmosphere high in water content, and they probably grew fast. It is likely that the temperature was relatively high and that the flakes were formed at the front of an approaching storm and probably from low-lying clouds.

By similar tokens the plate-like flakes shown on this page were probably formed in an atmosphere where there was relatively little water vapor. They grew slowly, at comparatively low temperatures, and were probably formed in the west or northwest part of an advancing storm, or at the rear of the storm. This position, of course, does not apply except to a general storm.

Some of the flakes on the preceding page may well have been formed at medium heights, and have developed under changing conditions and, obviously, at a varying speed. Most of these composite types presumably may have started slowly at high altitudes and low temperatures, and increased in speed of growth as they fell to lower elevations and higher temperatures. It is probably not so simple as it sounds, but I believe that in general these suggestions are valid.

More About Snow



MANY units in this series could be written about snow alone, but we have already given you more than you will find in most texts in general science, and much that is not to be found in common books on meteorology. We could write of granular snow, which is really frozen drizzle, the units of which do not rebound or disintegrate when they hit the ground; of wind-blown snow pellets that roll like balls when they hit a hard surface and are really little balls of snow crystals thrown together by the wind. Sometimes flakes and crystals are bound together by frozen fog, and sometimes they are replaced by solid masses of ice in the form of needles, plates, spheres and a variety of other forms. So far as this discussion is concerned we will be satisfied if it helps to a reasonable understanding of the more conspicuous differences to be observed in the commoner forms

of snow already given some emphasis. The School Page may provide some further interesting reading, if you wish more.

It is in a way purely academic to understand snow as we have presented it so far. What happens to it after it comes to the ground? Here we can make only an introductory statement. To help in this, we submit two photographs of fallen snow. One illustrates how snow makes it difficult for me to walk to my office by filling the sidewalk and roadway over which I must pass. There are tricks that snow engineers know that will prevent this sort of thing from happening, but we cannot discuss them here. The other picture shows a highly useful function snow may perform. The picture was taken a few feet from my back steps. It marks a spot where rabbits and squirrel tracks

abound. Here, under this snow-covered brush pile, is a sanctuary where hard-pressed wildlife may find warmth, freedom from exposure to the wintry blasts, and some sort of food. I have helped them on the food supply now and then, and I have resisted advice by foresters to get rid of the brush pile. Between the snow and me my little patch of woods will have an abundance of wildlife next summer. If you do not believe it, come and see us.



Lessons in Brotherhood

By NORMAN SKLAREWITZ

A LESSON in brotherhood and understanding, which is so much needed in the world today, may be learned from the birds and mammals at a unique wildlife sanctuary near Bartlett, Illinois, thirty miles west of Chicago. There more than a dozen different species of otherwise "wild" creatures roam about together, free of pens or cages.

The refuge is the hobby of Herman Goldberg, Chicago executive, whose curiosity about the instincts of animals led to the beginning of the farm ten years ago. It was then the relatively casual desire of Mr. Goldberg to try to determine whether wild animals could be tamed enough to set them free among other species usually considered their natural enemies. The experiment has been conducted continually ever since then, and, today, his 32-acre estate is a fascinating wonderland where man may walk among strutting peacocks and graceful deer, and where dogs and bears play with frisky raccoons.

Mr. Goldberg does not base his experiments on any scientific principles, and he is more a philosopher than a naturalist. As he explains it: "I merely had the idea that these animals might be wild because of their fear of being hunted, and their necessity of having to hunt in order to survive. I only removed the threat of being hunted from their lives, and the result in most cases is that they soon are tame. If any of the creatures were to be recaged, or set loose to be stalked, they soon, I think, would return to their original nature."

As it is, however, the animals are completely free and can, and often do, leave the estate entirely. But, with rare exceptions, they always return. Only the deer are kept from leaving, for their own protection.



Herman Goldberg feeds "Tuffy," the bear cub, a proceeding to which the fawn is quite indifferent.

At the present time there are twenty peacocks, a like number of deer, a Canadian black bear, two rare Colombian flamingos, a fox, a raccoon, four swans, and some lambs living on the beautiful wooded tract adjoining this home.

It is not unusual for the deer to come up to the house terrace, and a common visitor is "Tuffy," the four-month-old bear cub. Bruin's curiosity has led him into any number of pranks, including an incident with a milk truck, in which he succeeded in uncapping 180 bottles of milk that a new driver had unwisely left unguarded in the driveway. On another occasion he slipped into the storeroom and proceeded to unwrap and bite into 100 bars of soap, thinking there were candy bars hidden there.

The farm is, of course, in no way commercialized, and the only regular visitors to it are the girls from a nearby summer camp. Mr. Goldberg buys the animals when they are babies from commercial animal farms. Then he sets out immediately to acclimate them to their new home. For the first few days they are kept in pens until they get used to seeing the various other creatures nosing about out-

Esther Bohn, a visitor to the Goldberg sanctuary, has an armful of raccoon and deer when the bear cub pays a visit.

side. Then they are freed, and the new animals are usually soon a part of the family. Occasionally there is one that, by individual nature or temperament, cannot be adjusted to the unusual surroundings. It is returned. When the animals get too big to be kept safely around children, they are donated to zoos, or other such institutions capable of properly caring

for them. Mr. Goldberg always hates to see them go.

New varieties of birds and mammals are brought in each year, and the farm has had pheasants, storks, skunks, and a rare white fox in recent seasons. Watching his unusual charges Mr. Goldberg cannot help but feel that mankind today would do well to watch and learn from these simple creatures of the forest.



Feminine Note

By GRACE STILLMAN MINCK

When Mrs. Moon comes out at night
To walk a lane of silvery light,
She often wears a veil of lace
Across her pretty yellow face.
I wonder, could mere vanity
Sway anyone as old as she?

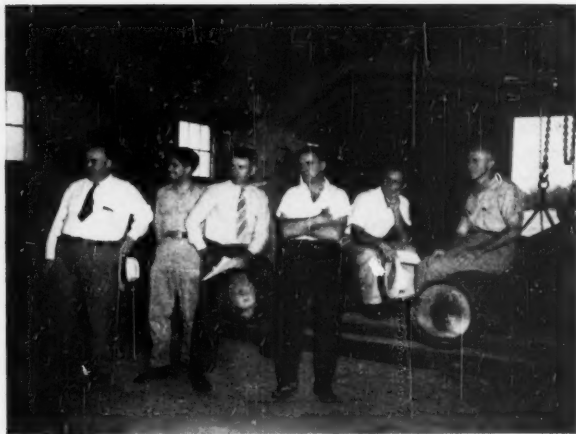


Hidden Nature Names

By HUGO H. SCHRODER

FILL in the spaces in the first column with the names of animals, plants or birds, for which clues are given. Each of these words contains another animal, plant or bird name, the letters of which are in proper sequence. For example: — — — — — 5 letters—a common garden flower (phlox); the hidden word — — 2 letters—a bovine beast of burden (ox). Some of the names may be stickers! How many can you get? Answers on page 98.

- | | | | |
|--|--|--|--|
| 1.; sea fish resembling the her-
ring. | 1a.; its leaf stalks are a table delicacy. | 8.; its drupes are eaten by birds. | 8a.; common fresh water fish. |
| 2.; produces both edible fruit and edible nut. | 2a. ...; tree belonging to the olive family. | 9.; also called screw pine. | 9a.; large bear-like mammal with black eye. |
| 3.; malva-
ceous plant. | a.; curve billed water bird. | 10.; <i>Tilia</i> sp. | 10a.; well known food fish favored by anglers. |
| 4.; glass-
worts, they grow in salt marshes. | 4a.; Iowa is noted for this plant. | 11.; belongs to morning glory family. | 11a. ...; female sheep. |
| 5.; hard wood used for furniture. | 5a. ...; producer of pork. | 12.; flowering shrub in southern gardens. | 12a.; one- or two-humped mammals. |
| 6.; dwarf tufted plants having opposite leaves and small tri-bracteate flowers arranged in heads. | 6a.; sometimes called sea swallows. | 13.; related to the banana. | 13a. ...; usually present at picnics. |
| 7.; an onion-like plant with a strong smell. | 7a. ...; fishermen do not care for this species. | 14.; small hunting dog. | 14a.; preys on small animals, birds and fishes. |
| | | 15.; tropical fruit, spicy and sweet. | 15a.; its seeds are pungent, used for pickling. |
| | | 16.; <i>Caltha palustris</i> . | 16a. ...; name applied to various female animals. |
| | | 17.; the wild olive. | 17a.; commonly grown for their colorful blossoms. |
| | | 18.; Australian marsupial of the genus <i>Perameles</i> . | 18a.; <i>Fulica americana</i> . |
| | | 19.; flowering thorn. | 19a. ...; destructive rodent. |
| | | 20.; saline plant growing along south Atlantic and Gulf coasts. | 20a. ...; flying mammal. |



Woodlot Co-op Clicks

By WALTER RUDOLPH



Some officials of Woodland Products, Inc., highly instrumental in this unique Co-op's first successful year, are, left to right: James McGowan, director; Howard Mendenhall, secretary; William Long (standing back), director; Paul Coates, president; Fred Coates, mill manager; John F. Romig, treasurer, and Charles Robinson, director.

FARMERS owning small woodlots have always faced a serious problem: How can they "harvest" their holdings profitably, and at the same time preserve their stake in a great, natural resource? One economically successful answer has been found by some 75 such farmers within a 25-mile radius of Downingtown, Pa. Banded together to form Woodland Products, Inc., their second annual meeting, last August, reported a 1948 net income of \$10,724.29, and fixed assets worth more than \$30,000!

"The idea for the Co-op began to jell late in 1945, just after I left the Army and was looking around for a job," said Howard Mendenhall, forester and secretary, who worked tirelessly to get the project under way.

Gleason Mattoon, now president of the Pennsylvania Forestry Association; Noah Hershey, president of the Coatesville Egg Auction; Paul Coates, prominent granger, farmer and woodlot owner at Downingtown; Fred Simmons, of the Northeastern Experiment Station, Philadelphia; A. C. McIntyre, of the United States Forest Service, regional office, and John Tyler, at the Farm Forest office in Norristown, Pa., were among the interested persons who aided in the early organizational work for this Co-op.

Months of research and gradually increasing interest among area woodlot owners preceded real organization. Law required incorporation, it was determined, but cooperative by-laws were allowed, and the group was granted permission to issue 1250 shares of common and an equal number of shares of preferred stock, at \$10 a share.

By the middle of 1947, investments amounted to about \$12,000, exclusive of costs for installing the sawmill equipment. Half of the sawing done at the mill was custom work for members, showing their hunger for this kind of service so that they could fix up their farm buildings without great expense.

Ordinarily, large sawmill operators, or itinerants who moved around through the countryside, literally

like wheat threshers, give the small woodlot owner a "rough time." They do not like to cut in something like five acres, say, claiming expenses are too high. Where they do cut for the small owner, it is claimed, they are irresponsible, wasteful, not caring if the forest is conserved, further planted or scientifically cared for. They "clean out" small woodlots, in other words. Mendenhall learned about this in his early efforts among local farmers in west Chester County.

Following an early meeting of Mendenhall, Mattoon, Hershey and Coates, the energetic forester was asked to draw up several possibilities for cooperative efforts in the area, for small woodlot logging and subsequent sawmill operations to the profit of all members. He came back with three suggestions:

Farmers could pool their logs and cordwood, etc., and market them through a central agency on a commission basis to sawmills, furniture plants and so forth, or as firewood and pulpwood. No equipment would be owned.

Farmers could own and operate an ultra-portable sawmill that would be moved around and set down on small woodlots to speed cutting and logging.

Lastly, they could own a permanently located sawmill and operate it for their sole benefit, marketing their logs, doing custom sawing badly needed for most farms (barns, hen houses, hog pens and so forth needed lumber), and woodlot owners would work for conservation and most profitable utilization of their trees.

Under the last, too, they could own logging equipment that would give them the benefits of mechanized, large-scale logging methods—equipment like chain saws, tractors, heavy trucks, and such.

At a third meeting, other interested farmers were present, and further study was voted on the information brought together. At a still later meeting, Tyler was present and was appointed secretary, and Paul Coates, chairman, as temporary officers, and the name, Chester-Delaware Woodland Owners Co-op Associa-

Woodland Products' backyard, or surplus stock at modern sawmill, is a welcome sight to small woodlot owners who were formerly in need of this kind of cooperative organization. They constantly seek new ways to dispose of their products. Note huge slab pile at left center.

tion, was given the group.

Charter members dug into their own pockets to purchase a two-man, gasoline-powered chain saw (Disston) and to hire a few men to begin cuttings on several of their woodlots. Organization became even more evident with the formation of an executive committee and the election of officers and directors—all this, mind you, before application was made for a charter.

It was then, about the middle of 1946, that the group learned about Pennsylvania law concerning a woodlot owners' cooperative, and the switch was made to Woodland Products, Inc., with its co-op by-laws. But, meanwhile, the "unavailability" of new logging equipment (remember how it was?) and unprofitable early cuttings had temporarily called a "quit" to woodlot operations.

However, in November, 1946, the charter was granted and the group found themselves with the right to "... manufacture, buy, sell and deal in, either for itself or as an agent for others, timber, lumber, millwork and other building materials of every kind and description, and in the development of woodlands and the resulting by-products of forests; and to engage in the buying and selling of machinery and equipment necessary and incidental to timbering, lumbering and millwork and to perform any and all things necessary and incidental to such business."

Members took heart and the Co-op began to move forward. A truck was purchased as stock was bought up; used sawmill equipment was added, and temporarily set up on a tract of land chosen as a site near Downingtown. This comprised eight and a half acres of clear, gently sloping ground along a hard-surfaced road, on the main line of the Pennsylvania Railroad and within easy reach of power lines.

As the location was already planted in alfalfa, it was decided to sell hay as a sideline income from the space not occupied by the sawmill. First logs had been cut by April 25, 1947, and in a month some 100,000 board feet of lumber were sawed out in spite of temporary shutdowns and training workers.

Late in August, 1947, at the first annual meeting the Co-op members learned that the first auditing of the books showed operation on the "red side," but was representative of only two months operation.

At that meeting they voted to erect a permanent sawmill building. Plans were approved for a concrete block structure, 42 x 140 x 14 ft., with an aluminum-sheeting roof. Maintenance is practically eliminated with such construction, which is also fire-resistant.



The mill will eventually house a small office, which at this writing is holding forth in a "chicken-house" structure near the sawmill.

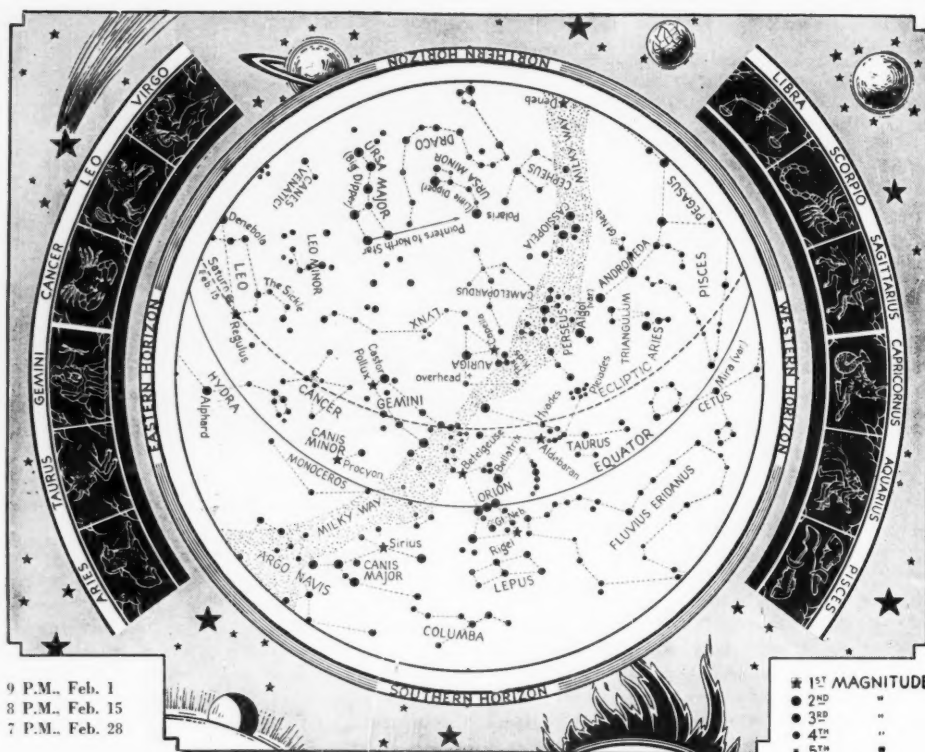
Individual members enjoy valuable service. Their trees are marked for cutting and the logging is supervised by the Co-op's forester, now Sam James, who plans operations for sustaining the yield, and suggests weeding, when necessary, and improvement cutting. Members can make arrangements through the Co-op to have its reliable contractor do the cutting, skidding and hauling, at reasonable rates. Custom sawing, accurately held to owners' specifications, can be done at the Co-op's modern sawmill, the charge at present being \$20 per 1000 board feet, payable in cash or logs.

Cash payment is made to members for trees standing on Co-op woodlots, or for logs delivered to the sawmill, equivalent to 95 percent of current prices, the remaining 5 percent payable in common stock, or in cash for amounts less than \$10. Members also may purchase additional stock with logs in lieu of cash. Lumber, sawdust and slabwood derived from the sawmill operations are sold at reasonable prices to members and others, and a continuous search for new and better markets for products is maintained.

Membership is open to any woodlot owner in the 25-mile radius from West Chester, Pa., which is the center of some 110,000 acres of timber land. Primary stipulation is that members practice good forestry.

Plenty of room remains on Woodland Products property for future expansion, as required. A dry kiln and planing mill are possibilities, say members, and other ideas include installation of fence post and timber treating equipment. On another tangent, the Co-op purchased one carload of southern pine to satisfy local demand, and, as the transaction was profitable, may undertake future dealings of this nature.

At the August meeting, members were attentive to a number of talks on conservation and wise use of forest products, saw a demonstration of logging equipment, and otherwise saw how cooperation works.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Rings and Satellites of Saturn

By ISABEL M. LEWIS

On February 21 Saturn will be in opposition to the sun and above the horizon from sunset to sunrise. At this time its brightness will be very nearly equal to that of Procyon, in Canis Minor, now visible in the evening sky. By the end of the year, however, it will have decreased in brightness until it will be no brighter than Regulus in Leo which is now not far distant from Saturn.

In the year 1944, at the time of opposition of Saturn to the sun in December, the planet was so brilliant that it surpassed all stars in brightness with the exception of Sirius and Canopus. At that time the southern side of the rings of Saturn was tipped toward the earth at an angle of 27 degrees, which is close to the maximum amount of elevation of the earth above the plane of the rings of Saturn. The exceptional brilliancy of Saturn at that time arose from the fact that the rings were then at their widest extent as

seen from the earth and were very considerably brighter than the surface of Saturn.

From 1944 on, due to the continual decrease in the elevation of the earth above the ring-plane, the width of the rings has steadily lessened. At the beginning of this year the elevation of the earth above the southern surface of the rings was only about 7 degrees and the elevation is still approximately that amount this month at opposition. The angle will fluctuate a few degrees during the year, due to the earth's changing position in its orbit, and will increase to about 10 degrees during the next few months so that they will be fairly well placed for observation from the earth for the first half of 1949; there will be, however, a rapid decrease in the angle at which the rings are tipped to the earth after Saturn's conjunction with the sun in September. By the end of December the elevation of the earth above the ring-plane of Saturn

The rings of Saturn, compared to their great extent in the plane of Saturn's equator, are unbelievably thin. The extent of the ring-system from the outer edge of the outer ring to the corresponding point on the opposite side of Saturn is approximately 171,000 miles. The inner edge of the inner ring, called the dusky or crepe ring, is only 7,000 miles above the surface of Saturn and its width is about 11,500 miles. It is the least dense of the rings and is faintly luminous. The central, brightest, and largest ring is 16,000 miles wide and is separated by a gap of about 3000

In addition to its rings Saturn has a large family of nine satellites which have been divided into three groups according to their distance from the planet. Within the innermost group are the satellites Mimas, Enceladus, Tethys, Dione and Rhea, named in the order

of their distance outward from the planet. All lie within a distance of 300,000 miles of the surface of the planet and all are either in or very close to the ring-plane and equator of the planet. Mimas skirts around the edge of the outermost ring at a distance of only 30,000 miles from it. Its orbit and that of all the satellites in this group are very nearly circular. Mimas and Enceladus are difficult objects to observe because of their nearness to the bright ball of the planet. Enceladus can at times be seen with a six-inch telescope, however. Tethys and Dione are visible in a four-inch telescope. Rhea, which is the brightest of the five, can be seen with a 2½-inch telescope. The diameters of Mimas and Enceladus are about 370 and 460 miles, respectively, of Tethys 750 miles, Dione 900 miles, and Rhea 1150 miles. A gap of 400,000 miles separates this group of inner satellites from Titan and Hyperion, which form an interesting group together. Hyperion is about 160,000 miles more distant from Saturn than Titan. The diameter of Hyperion is only 300 miles. Titan has a diameter of 3550 miles and is the largest satellite in the solar system, not even with the exception of our moon, and the only one that is known to possess an atmosphere. It can be seen with any instrument greater than an inch in diameter and can easily be recognized not only by its superior brightness but by its decidedly reddish color as well. Dr. G. P. Kuiper discovered in 1944 with the 82-inch reflector of (Continued on page 98)

By OSCAR OSTLUND

The stars are notes in heaven's symphony;
The galaxies conjoin harmonic, melody on melody.
The sunlit day is lyric, undulating in its ebb and flow
Of light, reposeful in the evening; resurgent in the dawn;
aglow
With colors leaping into splendor borrowed from the
Infinite.
The Gloaming deeps, the gulfs—between the stars—unlit;
These realms, aloof, imply ideas, hidden; poems of the
inexpressible, they underscore
The wonder of star cities flung throughout the dark im-
mensities that are God's metaphor.

Camera Trails

By EDNA HOFFMAN EVANS

SOMETIMES it is spelled *saguaro*, and sometimes it is spelled *sahuaro*. In either case it is pronounced so-wa-ro. In all cases it can be termed magnificent.

What is it? The saguaro is that species of giant cactus, examples of which rear their prickly heads by the tens of thousands all over southern Arizona. I had never seen a saguaro until a few short months ago. Since then, I have seen hundreds of them, and have photographed dozens. In spite of proximity, plus photographic evidence, I still cannot quite believe them.

Photography is photography, regardless of whether your lens is focused on the capitol dome in Washington, D. C., or on the crest of Mount Rainier in the State of Washington; on a wave-tossed expanse of the Caribbean during a period of rough weather, or on a calm, cactus-and-mesa-studded stretch of desert.

In each case the photographer must focus properly, must hold his camera steady, and must press the button that trips his shutter and exposes his film. Yet in each case, also, there are different techniques that must be used in order to obtain the best possible results.

Take desert photography, for example. There are a lot of tricks to it—some of which I have learned by the process of trial and error, and some of which still remain tantalizingly undiscovered. It will take a lot more time, experimentation, and film before I can claim the desert as a part of my familiar photographic stamping grounds.

Some people like the desert and some do not. Some people see it as nothing but a dreary expanse of sunbaked earth, stone, and distorted vegetation. Others see in it a restful charm, a peace, and a simplicity that can be duplicated nowhere else on earth. I am one of the latter—and yet I am amazed that I could move so quickly from the lush vegetation and swamps of the Southeast to the waterless rivers, barren hillsides, and vast deserts of the Southwest. I find that I love them both—wet and dry, green and brown, fertile and arid. Nobody could have a nervous breakdown on the desert, any more than he could develop a case of stomach ulcers in the Florida Everglades. True, he might die of thirst in one, drown in the other, or starve to death with equal speed and finality in both. But the Nature lover and the Nature photographer can forget the woes of this modern world beside a saguaro column, or under a mangrove bush.

But to get back to the business of desert photography.

The light is unbelievable. Except on overcast days—so rare they are virtually non-existent—the sky is cloudless and blue. Dust or heat haze may blur and soften distant outlines, but the exposure meter will record the highest of light values. Lenses can be stopped to fantastically small apertures while the shutter speed remains well above 1/100th of a second. This fact, of course, makes it possible to obtain great depth of field and fineness of detail.

Filters, on the other hand, give results that are disappointing. There are no dramatic cloud effects to be emphasized with red or orange filters, and no varying tones in vegetation to be brought out by green or yellow ones. The lens itself will do the job, providing diaphragm aperture and shutter speed are gauged correctly.

Finding a picture is difficult. The eye sees mile after mile of desert, broken here and there with saw-toothed mountains and cactus columns. Everything looks photogenic, especially to the newcomer. But seen through the view finder or in the groundglass, that same area takes on an



Strange rock formations and sentinel saguaros add interesting details to the Arizona desert.

entirely different aspect. Usually it lacks something, some outstanding detail, some center of interest. Here, then, is where art enters into photography, and one must hunt for his picture.

A few weeks ago I went on a short desert trip with an artist, and never before had I been so conscious of the similarities and differences between art and photography. The artist could settle anywhere—with pencil and sketch pad, with brush and water-color—and construct a picture. An odd-shaped cactus on the left could be moved (on paper) to the foot of a mountain at the right. Details could be emphasized or eliminated entirely. The finished picture was the desert, but it was not any one particular and exact stretch of desert.

I, on the other hand, had to carry the camera and tripod from place to place, set them up, take a look, move, and set them up again. I had to take Nature as it was, and search—until I found the picture that I wanted. The artist could select and reject without moving.

It is not possible to capture "all outdoors" with a camera. A vast expanse of countryside fills the eye and satisfies the soul.

But it does not always look so good in a photograph. Thus, I have found that it is better to look for details, for strangely beautiful rock formations, or odd groupings of cactus plants. Individual cactus trees make good subjects. No two are ever alike, but some are more individualistic than others. This one grows straight and tall, with never a branch to mar its column-like grandeur. That one looks like a prickly green, seven-branched candlestick. A third sends all its branches skyward. A fourth, with two parallel branches jutting out and slightly downward, looks for all the world like a punch-drunk boxer on the defensive.

Already, I have started to collect pictures of odd-shaped saguaros. Some day I hope to have a gallery of characters and actions. That will take time, of course. But one does not think of time or hurry in the desert.

Saguaros are good subjects for trick shots, too. Rest your camera on the ground and turn your lens upward along the soaring trunk. By stopping down the lens and slowing up your shutter, you can get each spine in focus, from those at the ground level to those on the crest that towers twenty-five or thirty feet above your head.

Other good detail shots can be made of cactus skeletons, particularly those of the slender, spiny *ocotillo*. Once the soft material has weathered away, those gray skeletons look like lace work; like the remains of sponges or of



Despite proximity and photographic evidence, the saguaro is hard to believe.

coral formations. To a former shore-dweller, it seems strange to find such things in the desert.

As I said before, there are still many things I must learn about desert photography. I have yet to master completely the big, obvious things in it. After them come the smaller things—cactus blossoms, for example, and individual portions of the less spectacular vegetation.

Then come the other desert dwellers, pack rats and pocket mice, ground squirrels and kangaroo rats, jack rabbits, coyotes, deer and antelope, lizards, snakes, spiders and scorpions. Birds build their nests among the branching arms of the saguaros, in the sagebrush, and on the ground. Creatures wearing fur, scales, or feathers, moving by wing-power, on paws, or on six or eight legs, are to be found if one learns their haunts and has the patience and skill to photograph them.

The desert is not dead, and it is not lifeless. It presents countless problems and endless possibilities for the Nature photographer. Thus far, to summarize my findings, the desert photographer should:

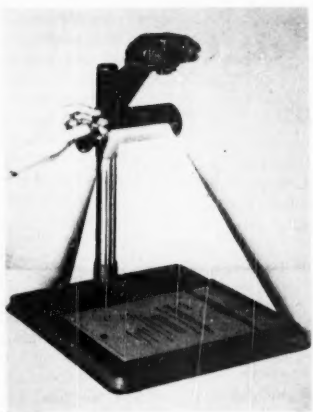
1. Depend on lens stop and shutter speed, rather than on filters, for dramatic effects.
2. Choose his scenes with care, so there is some center of interest to give them meaning.
3. Look for unusual details and photograph them as individuals.
4. Move with care to protect his clothing and person. Almost everything on the desert has spines, thorns and/or prickles on it.

RANDOM JOTTINGS

The Eastman Kodak Company has issued another of those handy, twenty-five cent how-to-do-it books on photography. This one is titled "Picture Taking Indoors." By means of pictures, diagrams, cartoons, and non-technical explanations, the book tells the best methods for taking still pictures indoors by means of flash, flood, daylight or under ordinary home lighting conditions. The directions cover the use of simple fixed-focus, box-type cameras, as well as cameras having variable lens settings and shutter speeds.

Included is a check list of seven questions—points that every Nature photographer will do well to remember, whether he is operating indoors or out.

They are: First—"What's behind the subject?" The answer is, choose a plain background, or throw it out of focus if it contains distracting details. Second—"What's the subject doing?" Answer, some natural activity, if possible. Third—"Will the subject move?" If so, speed up the shutter and arrange for more light. Fourth—"What film are you using?" If color film, be sure to use the kind of light recommended for that particular film. Fifth—"How far is the lamp from the subject?" Sixth—"Don't let your lens be bedazzled!" Seventh—"How far is the camera from the subject?"



Bolsey Universal Stand.

Owners of Bolsey B model cameras can do microfilm work now, by means of a new Bolsey universal stand which includes a base and frame for the documents to be filmed, a supporting column, a supporting crib for the camera, and a tubular 40-watt lamp to provide illumination. Prospective microfilmmers may obtain more information from Jacques Bolsey, President, Bolsey Corporation of America, 118 East 25th Street, New York City.

And for photo-contest fans, there is a new monthly one announced by Remington Rand, Inc., makers of RRembrandt projection papers. The first contest, which closes February 14, will stress combination printing. Entries will be judged on the basis of this technique, plus photographic and pictorial quality. The first prize is \$100. For full information as to rules and regulations, write to the Contest Editor, Remington Rand, Inc., Photographic Department, 315 Fourth Avenue, New York 10, N. Y.

March 14 is the closing date of the Third Michigan International Exhibition of Nature Photography, sponsored by the Cranbrook Institute of Science and co-sponsored by several Michigan and Detroit Nature organizations. Accepted prints will be exhibited at the Detroit Flower Show, March 26 through April 3, and at the Cranbrook Institute of Science, April 5 through April 15. Full information about the salon may be obtained from Roger E. Richard, P.O. Box 2411, Dearborn, Michigan.

From May 17 to June 20, *Hobbies*, the magazine of the Buffalo Museum of Science, will hang its Eleventh International Salon of Nature Photography at the Buffalo Museum of Science. There will be sections for monochrome and color. Complete information appears on the entry form, which may be obtained on request to the Buffalo Museum of Science, Humboldt Park, Buffalo, New York.

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The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

SNOW IN SCHOOL

IF YOU want some fun, pick up the nearest general science text or book dealing with meteorology designed for use at the pre-college level. Look in the index under snow and read what is to be found under the reference given, if anything is to be found there. I venture to predict that, while you may find a few pictures of snowflakes, you will be given little help in classifying them or in understanding why they differ as they do. This may make the article on snow elsewhere in this number of *Nature Magazine* useful to you. To quote from one general science text, we find that "snowflakes vary in shape, and thousands of different forms have been studied." We might also read that there are many thousands of different kinds of plants and animals. We doubt if that would give us much understanding of the plant and animal kingdoms. In only five out of twenty-five general science texts I have just examined do I find snow even mentioned in the index, and in some dealing exhaustively with climatic conditions, on other units of the solar system, we find no studies suggested for the snows of our own earth.

On this page in earlier years we have suggested many things to do in the study of snowbanks. We see no reason for repeating them here. Instead, we would like to give you a few sayings about snow, and suggest that you try to find by observation in the next few weeks—if you have snow available—which of them have some basis of validity in your own neighborhood.

There is a saying, reputed to come from New England, that "it takes three cloudy days to bring a heavy snowstorm." What elements of truth can you find in such a statement? Is it a safe criterion to follow in predicting a heavy snowfall at any part of the winter, and granting that it might hold in New England, does it hold equally well in other parts of the country?

In Sweden, they have the saying, "Much snow—much hay." Obviously the snow has something to do with the water-table, which has something to do with the hay crop, so can you accept this statement as representing the facts? Another related saying has it: "If the snow that is falling during the winter is dry and is blown about by the wind, a dry summer will follow." Think that one over to see what element of truth there is in it. Another statement in the same vein tells us: "A heavy fall of snow indicates a good year for crops and a light fall the reverse." Bacon tells us: "Snow cherisheth the ground and anything sowed in it," and a Russian saying gives

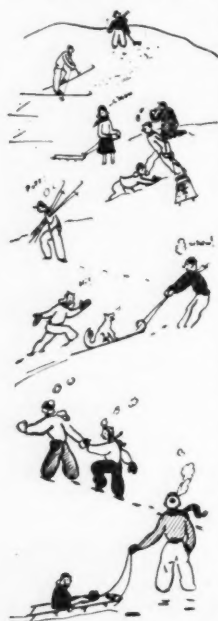
us the statement that "corn is as comfortable under the snow as an old man under his fur coat."

While most of these sayings may have some basis of fact, let us look at a few others. One tells us that "when snow falls in the mud it remains all winter." Can you find any evidence to support this? Another tells us that the number of days the last snow remains on the ground indicates the number of snowstorms that will occur the following winter.

Using the information given you in the snow article earlier in this magazine, see if you can find any basis for fact in the quotation: "If the snowflakes increase in size, a thaw will follow." And if this gives you faith in sayings, then try to reconcile the ideas in these two: "If the first snow sticks to the trees, it foretells a bountiful harvest," and "If the snow remains on the trees in November, they will bring out few buds in the spring." Towards which of these suggestions do you feel you have the greater agreement?

Start in now studying snow in all its forms, in the air and on the ground. Look for records of new falls, and of warm periods, in the section of a snowbank. Look up in some physical geography, or in a dictionary, to find out what an esker is, and then watch the snowbanks along the roadside to see if you can discover some minute eskers in the making. Try to understand something of the nature of snowslides by noticing the behavior of snow on neighborhood roofs with varying degrees of slope. Down which of these roofs do the snowslides first occur, and why? Make small cardboard snow fences, and try placing them in such a position that they can make snow accumulate in a spot selected in advance. Learn what snow does under varying conditions, and then so set the stage that snow does what you want it to do, whether this means that you want to hold it on soil in which winter wheat is growing, or whether you wish to hold it so that the water melting from it will enter the soil on your land where it may find a use in times of drought. Do not forget to arm yourself with a stick with various lengths marked on it, and go about your neighborhood measuring the depth of the snow in different places and at different times in the winter. Keep some notes on what you find and try to use them to interpret what you find happening later in the season. Do not forget to bind a thermometer to the lower end of this snow-stick of yours, and then take the temperature of snowbanks to find how conditions vary at different depths. If you can, devise some way of reading the amount of light penetrating snows of different depths. Determine from direct experience how much water will melt from snows of different apparent density, and make some estimate of the amount of water available in snow form in your school yard, your home lot, your farm, or the county. These experiences are the sort of things that will make statistics such as you find in weather bureau reports or farm reports really significant.

Of course you should not get the idea that a bank of snow to a child means only a problem in arithmetic, or in elementary physics. They know better, and if you find that they wish to slide, snowshoe, ski or walk over or through the snow, try to study the conditions that make these sports more thoroughly enjoyable. There is some science in all of these studies. It may be better science than you can possibly find in any published text.



Abalones

Featuring the October, 1948, issue (Vol. 34, No. 4) of *California Fish and Game*, official publication of the Division of Fish and Game, California Department of Natural Resources, is a notable article, with illustrations, on the abalones of California and their present status. The author is Paul Bonnot, marine fish authority.

Through the Ice

Ice Fishing for Everybody. By Byron W. Dalrymple. New York. 1948. Lantern Press. 257 pages. Illustrated. \$3.50.

Without checking bibliographies, we would guess that this is a fishing book that covers new territory, at least insofar as it concerns itself exclusively with ice fishing and its techniques. The author is associate curator of fishes at the American Museum of Natural History, and his colleague, Francesca LaMonte, who holds a similar title, contributes an introduction to this interesting and practical book. Our ice fishing activities having been practically nil, we were surprised to discover how much there is to it, and we are confident that fishermen will find this volume a "must" for their libraries.

New Biology

Adventures with Animals and Plants. By Elsbeth Kroeber and Walter H. Wolff. Boston. 1948. D. C. Heath and Company. 600 pages. Illustrated. \$3.20.

This is a new high school biology text with an intriguing title and with a presentation, both textually and pictorially, that is calculated to foster an interest in biology on the part of the student. The book is organized into units, each one of which presents a major topic in biology. Problems presented in each unit give a degree of dynamic significance to the study of the unit.

Fish Stories

Great Angling Stories. Selected and edited by John M. Dickie. New York. 1948. The Macmillan Company. 436 pages. \$1.50.

Axiomatically, fishermen are, of course, reputed to be great story-tellers, at least when it comes to angling exploits. And, naturally, many of these have found their way into print, some to the point of becoming piscatorial classics. John M. Dickie has, apparently, read a library of such tales, and from this has chosen wisely and interestingly for his anthology.

Waterfowl Management

Waterfowl Management on Small Areas. By C. E. Addy and L. G. MacNamara. Washington, D. C. 1948. Wildlife Management Institute. 84 pages. Illustrated.

This is a practical little booklet designed to help in the direction indicated

by the title. Mr. Addy provides material under the title "Ponds and Marshes for Waterfowl," and Mr. MacNamara contributes advice on "Methods of Pond and Lake Construction."

Chanticleer Books

Leaf, Fruit and Flower and Let's Learn the Flowers. By Marshall McClintock. New York. 1948. Chanticleer Press. 29 pages each. Illustrated in color. \$1.00 each.

These are attractive Chanticleer Junior Books that will stimulate an interest in and knowledge of plants among young people. The excellent reproductions from color photographs are supplemented by simple and informative text.

British Birds

British Birds. By Wilfred Willett. New York. 1948. The Macmillan Company. 196 pages. Sixteen color plates and 44 drawings by Roland Green. \$2.50.

This is a popular discussion giving details of the habits and characteristics of more than two hundred species of British birds.

CARE Seed Packets

Two CARE seed packages containing potential vast harvests of food for humans and fodder for livestock in Europe are announced by CARE, 59 Broad Street, New York 4, N. Y. Thirty-one selected varieties of vegetable seeds, enough to plant a garden up to 50 by 150 feet, are contained in the package designed for family use. The other packet, weighing twenty pounds, holds enough hybrid field corn to plant two and one-half acres and provide valuable feed for fattening meat animals, or maintaining a high level of production in dairy cattle. These packages are available for four dollars each, and CARE will deliver them to any one of eleven different European countries.

Wildlife in Winter

Whether it is a hard winter or a light one, wildlife can stand a lift so far as food is concerned. There are many little things that can be done to help the feeding problem, and the U. S. Fish and Wildlife Service, Washington 25, D. C., has available an excellent booklet, *Conservation Bulletin No. 12*, entitled "Feeding Wildlife in Winter", which will be sent on request.

Fox Terriers

All About Fox Terriers. By George Frank Skelly. New York. 1948. Orange Judd Publishing Company. 299 pages. Illustrated. \$4.00.

This is an all-inclusive handbook to a popular and beloved breed of dogs. We should say that no fox terrier owner should be without a copy if he is to give his pet the best care, or if he is properly to evaluate the merits of a show dog of this breed.

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ODD EXPERIENCES WITH ANIMALS

(Continued from page 75)

Now to Africa: Because of the crocodiles it was dangerous to bathe in the White Nile at Rhino Camp, so called because it was in this vicinity that Colonel Roosevelt hoped to obtain specimens of the so called "white" rhinoceros to make a family group for the United States National Museum at Washington, D. C., a task in which he was eventually successful.

The late afternoon sun cast a shadow over a pool of water in a deep, rocky ravine, so, taking advantage of the situation, I undressed on the top, and climbed down into the water. After splashing about to my heart's content, I sat on a rock waiting for my body to dry off, and then silently climbed back up the side of the cliff. As I poked my head over the rimrock, there, not five feet away, was a troop of baboons, with several pieces of my apparel in their "hands", carefully examining them. At my appearance, however, they dropped the articles and, with much guffawing, scampered off over the veldt and disappeared in a wooded donga not far off. I have often wondered what would have happened to my clothes had I not appeared at the critical moment.

At another time a huge boulder, the size of a small house, cast a shadow over a part of a small, shallow pool, so again I took advantage of the situation to take a dip. Not long after I started splashing about, a cormorant, a web-footed fish-eating bird, common on the White Nile not far away, settled in the pond, and, swimming to a flat rock at the water's edge, climbed upon it and began plucking its feathers. I moved around slowly, splashing the water until the bird had become accustomed to my actions. Then, with only my head above water, I first slowly passed it as far away as the pool would permit. Gradually I kept drawing nearer and nearer, until I could reach out and touch the cormorant. It pecked my hand gently several times, but, discovering that I did not hurt it, it finally allowed me to stroke its back and neck without objecting. I can account for this extraordinary experience in no other way than that the Nile was filled with pink-skinned hippopotomuses, both young and old, which never molested it, and the bird must have considered me as some sort of relative.

At Rhino Camp, Egyptian kites, a species of hawk closely resembling in both size and appearance our American marsh hawk, were common and very tame. As I sat in my tent skinning birds and small mammals, I would toss the bodies out front and they would retrieve them. This gave me an idea, so I went out, held a body in my hand, and as they

circled about not more than six feet overhead, I would toss it into the air and one would catch it in its claws and eat as it circled. This is the only time that I have known of a hawk so doing, as other African and American birds of prey usually perch before feeding, unless the prey be insects or invertebrates.

Because of the rivalry among them, I have no doubt that had I placed a mouse body on the end of a pole and held it up, one would have taken it, then, by gradually shortening the pole by letting it slide through my hands and finally discarding it entirely for a shorter and shorter stick, I could have tamed at least a few of them to take the meat from my hand, as I have often done with many species of birds and various kinds of food.

THE RINGS AND SATELLITES OF SATURN

(Continued from page 93)

the McDonald Observatory, that this satellite showed the presence of both methane and ammonia in its atmosphere. The orbits of both Titan and Hyperion lie in the plane of the rings but the orbit of Hyperion is greatly perturbed by Titan. Hyperion has been easily found in a six-inch telescope when in conjunction with Titan, which always occurs when the two bodies are farthest apart. A gap of more than a million miles separates Hyperion from the third group of satellites, which consists of Japetus and Phoebe. The diameter of Japetus is about 1000 miles and that of Phoebe is about 150 miles. This remarkable little body is moving in backward motion around Saturn, that is, in an east to west instead of west to east direction, and its orbit, like that of Japetus, is highly inclined to the plane of the rings and very eccentric. It is the most distant from Saturn of all its satellites, more than 8,000,000 miles, and it takes 550 days to complete one revolution around Saturn. Japetus is remarkable for the fact that it varies very noticeably in brightness. It seems probable, from the observations, that one side is brighter than the other and that it always keeps the same side turned toward the planet. Under favorable circumstances Japetus can be seen in a three-inch telescope. At time of disappearance of the rings and, in fact, for a year or more before and after that time, the six inner satellites of Saturn present the same phenomena that are so easily observable and so interesting a feature of the four historic satellites of Jupiter. These are the eclipses in the shadow of Saturn, occultations of the satellites behind the disk of the planet, and transits of the satellites and their shadows across the disk of Saturn. Even before the end of 1948 some of these phenomena were observable in the case of Tethy and Dione. The phenomena were observable for Mimas and Enceladus even

earlier, but were not generally predicted because of the difficulty of observing them. Phenomena for Rhea and Titan become visible this year.

On March 2, 1921, about the time the earth was passing through the plane of the rings from the south to the north side, a remarkably interesting photograph was taken showing the rings practically as a line and the six innermost satellites strung out along the plane of the rings like beads on a wire, small brilliant points of light. Enceladus was on one side of Saturn and the other five satellites on the opposite side.

In February Saturn will be the only bright planet visible in the evening sky. Mars, though still in the evening sky, is too close to the horizon at sunset to be observed. Mercury may be seen in the morning sky ten days or more before the date of its greatest western elongation on February 28, and Jupiter, which passed to the morning sky on January 1, may now be seen in the morning sky in Sagittarius. Venus is still in the morning sky, as always a brilliant object but slowly drawing nearer to the horizon at sunrise.

Nature Camps

Dedicated to the training of adult leaders in Nature work, the Audubon Nature Camps will hold widely separated sessions in 1949. The Maine camp on Hog Island in Muscongus Bay, sixty miles northeast of Portland, will hold its eleventh season, while the camp eight miles north of Greenwich, Connecticut, will inaugurate its sixth season. The two newcomers to the list are the California camp in Sugar Bowl Valley in the Sierra Nevada, and the Texas camp on the banks of the Guadalupe River near Kerrville. Each will hold its second year of sessions. Enrollment in all the camps is limited, but several sessions are provided at each one. Full details about all of the camps can be obtained from the National Audubon Society, 1000 Fifth Avenue, New York 28, New York.

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11. breweria	11a. ewe
12. camellia	12a. camel
13. plantain	13a. ant
14. beagle	14a. eagle
15. sapodilla	15a. dill
16. cowslip	16a. cow
17. oleaster	17a. aster
18. bandicoot	18a. coot
19. crataegus	19a. rat
20. batis	20a. bat

Day Reports on Mexico

Returning from a visit to Mexico, where he conferred with Mexican Wildlife officials, Albert M. Day, Director of the U. S. Fish and Wildlife Service, reports on the waterfowl situation in Mexico. His comments bear directly on matters discussed on the "Contents Noted" page of this issue of NATURE MAGAZINE. Mr. Day asserts that the annual waterfowl kill by Mexicans is probably less than five percent of the total yearly take in the United States. The bulk of the birds, he states, are killed by Indians using antiquated, muzzle-loading shotguns and spears. The birds are taken for food, and costs comprise a major portion of the Mexican waterfowl kill.

Hunting waterfowl is not a popular sport in Mexico, Mr. Day says, although considerable hunting is done along and near the international border by citizens of the United States. Most of Mexico's waterfowl wintering grounds are so inaccessible to hunters that they constitute excellent natural refuges for the birds. Mr. Day asserts that the Mexican authorities are striving to improve enforcement in accordance with the terms of the U. S.-Mexican treaty of 1936 protecting migratory birds and game mammals.

Mr. Day's observations do not bear out the claims, made in some quarters, that the Mexican kill is contributing materially to reduction of the migratory waterfowl supply.

Planning and Civic Annual

American Planning and Civic Annual. Edited by Harlean James. Washington, D. C. 1948 American Planning and Civic Association. 180 pages. \$2.00.

This is the annual record of recent civic advance in the fields of planning, parks, housing, neighborhood improvement and conservation of natural resources. This annual also includes the proceedings of the Citizens Conference on Planning. This is always a valuable publication, and a complete set of the Annuals from 1935-1948 are still available at twenty dollars a set.

Minerals for Growth

Mineral Nutrition of Plants and Animals. By Frank A. Gilbert. Norman, Oklahoma. 1948. University of Oklahoma Press. 131 pages. Illustrated. \$2.75.

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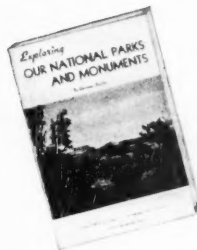
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MOTMOTS—DANDIES OF THE BIRD WORLD

(Continued from page 72)

land species.

Motmots never line the enlarged chamber at the inner end of their long tunnel, but lay their eggs directly upon the bare earth, as kingfishers do. The short, blunt eggs are pure white. Turquoise-browed motmots lay sets of four, or sometimes only three eggs. Blue-throated green motmots produce sets of three, depositing them at intervals of two days; and three was the number of young in the single burrow of the blue-dialed motmot that I investigated. Since it is usually impossible to open the deeply placed burrows of this species without destroying them, I have not examined the contents of more than one.

Among motmots male and female share the task of incubation, sitting alternately, as with kingfishers. By day blue-throated green motmots sit from three to six hours at a stretch, and by night both male and female sleep with the eggs in the burrow, which had been their nightly bedroom for the preceding nine months or so. But with the lowland turquoise-browed motmot a single parent, presumably the female, sleeps with the eggs in the newly dug burrow. One exceptional burrow in the bank of the Río Morjá in Guatemala was so straight that with an electric torch I could look in at the mouth during the night and see the bird while she slumbered. The yellow artificial light so transformed her colors that at the first glimpse I was alarmed, supposing that some gray-furred animal had stolen into the burrow, devoured the motmot and her eggs, and now rested curled up in her place. But closer scrutiny revealed the bright band of turquoise on her brow, and reassured me that I in fact beheld the motmot sleeping peacefully on her eggs. Her head was inward, at the back of the chamber, and her long tail extended forward into the entrance-tube, with the blue-and-black racquet at the ends of the central feathers so far in front of the remainder of the bird that they seemed not to be attached to her, but rather to be isolated discs of feathers caught up in the ceiling. On subsequent nocturnal visits I always found the motmot sleeping in the same fashion, her head inward and her long tail running outward into the tunnel, where alone it found ample space without becoming bent. This was the secret of how the birds preserved their long racquet-feathers clean and unbroken during the course of incubation.

While sitting in the nest, motmots regurgitate the glittering shards of beetles and other indigestible parts of the insects and other creatures they have eaten, along with a few seeds, until a considerable amount of this material accumulates on the floor of the burrow. During the

many months when blue-throated green motmots occupy their burrows as dormitories, this refuse forms a thick, firmly compacted layer. An occupied motmots' burrow can always be distinguished by the sharpness of the two parallel runs made along the floor of the tunnel as the birds shuffle in and out on their short legs. After the motmots finish nesting, their burrows are often claimed by swallows; then the two deep furrows are replaced by innumerable fine scratches made by the swallows' toes.

Blue-throated green motmots' eggs hatch after twenty-one or twenty-two days of incubation, which is also the period of the Amazon kingfisher. The birdlings hammer at the hard white shells for three or four days before they succeed in pushing off the blunt end and squirming out. Pink-skinned, with relatively huge lumps on the sides of the head representing future eyes, as innocent of feathers or down as the eggs from which they have just escaped, newly hatched motmots give no promise of future loveliness. At the time of their birth the devotion of the parents is at its highest pitch. When the burrow is opened at the rear, they merely retreat into the entrance tunnel, remaining there close to their little ones, although they might easily fly out through the front door. At this period I even lifted an unresisting blue-throated green motmot from above its nestlings. After examining both parent and little ones, I returned all to their chamber and closed up the back door.

Both parents feed and brood the nestlings but are unable to remove the rather liquid excreta, which soon befoul the chamber in the earth, just as with kingfishers. As the youngsters shuffle around on their hard nursery floor, their heels are protected from abrasion by little oval pads of thickened skin. Reared in the hot lowlands, nestling turquoise-browed motmots are at no stage of development covered with down; their horny feather-sheaths become quite long while still guarding the feathers tightly enclosed. When the youngsters are twelve days old they fairly bristle with these long "pin-feathers", which now at last break open at the ends and allow the plumage to expand. During the following week the youngsters become well feathered, but linger in their snug underground retreat until they can fly well. When at last they emerge, at the age of twenty-eight days or a little more, they closely resemble their parents in coloration, but still lack the long racquet-shaped tail feathers. Their beautiful plumage, bright and fresh, bears no stains from the foul, maggot-infested chamber where it unfolded in darkness. After the flight of the fledglings, this chamber is abandoned by both parents and young.

The development of the blue-throated green motmots in the cool highlands

follows a somewhat different course. At birth they are quite as naked as their lowland relations, but by their tenth or eleventh day they have become fluffy balls of dark-gray down and contrast sharply with the bristly, porcupine-like turquoise-browed motmots of the same age. During the latter part of their life in the nest, these downy gray feathers are gradually overlaid by green contour feathers that develop more tardily; the young blue-throated green motmots change color with no loss of plumage, and before they emerge from the nest also closely resemble their parents in coloration. Both of the old birds continue to sleep with the nestlings until these are about three weeks old, after which their behavior varies. In some families one or both parents abandon the burrow as a sleeping place during the last week that the nestlings remain in it, possibly driven to do so by the terrible din that the hungry, importunate youngsters set up as soon as they awake at the first peep of day. But in other families one or both parents pass the nights with the nestlings until the latter take wing at the age of twenty-nine to thirty-one days, when they are quite competent in flight.

Then the unexpected happens. The parents as a rule return at nightfall to sleep in the old, dirty burrows; but the youngsters, who hitherto have led such sheltered lives, are left exposed to the cold rains which now, at the end of May, fall almost every night. When the young motmots have been abroad a month or so, and can find at least a part of the food they need, the parents take advantage of a lull in the rains to dig a fresh, clean burrow, usually between one and ten yards distant from the one that has been their home for the last year, and where their children were reared. Here, if everything goes well, the pair will sleep huddled snugly together through the rainy months from July to October, and through the frosty months from November until the beginning of April, when they will lay their three white eggs and rear another brood. I am not sure when the youngsters mate and dig their burrows; but the available evidence suggests that it is at about the same time of the year when their parents excavate—that is, when they are about two months old.

Color Film Service

We receive frequent requests from readers for suggestion of sources of 35mm natural color slides for use in club programs and other entertainment. There are not many sources but recently we came upon the material available from Harvey Meston, Box 3105, El Paso, Texas. Mr. Meston has built up a fine collection of national park and monument slides, scenic subjects and some natural history material. A card to him will bring his catalog.

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Under the Microscope

By JULIAN D. CORRINGTON

BIOCENTENNIALS

Goethe—Rosenkavalier of Science

Two hundred years ago, in 1749, the author of *Faust* was born at Frankfurt-am-Main. The world knows him as a poet. You can look in the biographical section of the dictionary and find him put down as a German author. There it is—Johann Wolfgang von Goethe, 1749-1832, German author. But that describes his career about as effectively as referring to Aristotle as a philosopher, or to Leonardo as an artist.

What Everyman usually does not know is that Goethe was a lawyer by training, a politician—and a corking good one—by earlier profession, a theatrical director later in life, while by avocation he was poet, novelist, dramatist, artist, and architect and, according to his own preference, a scientist. Not just your run-of-the-mill pedantic scientist, either, but the effective founder of a whole new school, known as Natural Philosophy (German, *Naturphilosophie*) or Romanticism, opposed to Classicism on the one hand and to Materialism on the other.

It is difficult to describe for anyone today just what romanticism meant, for the sufficient reason that the votaries of this philosophy themselves could not put their beliefs into meaningful words. The actual founder of this movement was probably the philosopher Schelling. Some would say it was his teacher, Fichte. Elements were borrowed from Kant and from Spinoza and others, but the outstanding expositor was Goethe.

This school held, for example, that all science, indeed all existence was one, a unity throughout the universe of matter and spirit. There are many people living today who will sagely nod their heads in approbation when a statement of this character is made by someone whom they hold to be an authority, just as was the case in Goethe's day. Actually, such a statement is a mere rigmarole of meaningless words, but similar ideas were commonplace then, and still are, in certain circles. Very few people are as yet educated in the sense of possessing the ability to discriminate real meanings from mere words, and so we must not be too hard on the nature-philosophers of the eighteenth and nineteenth centuries.

A cardinal principle of romanticism was goodness, a glorification of Nature; everything was wonderful and beautiful and was put here for a purpose. If you could see no good in a scorpion, it was because you had not yet discovered the purpose of the Almighty in placing scorpions among us. You went on hikes and picnics and communed with smiling Nature, and you enjoyed all the lovely bees and birdies, and you never saw the sordid and ugly side of life with its bloodthirsty predators, its loathsome parasites, and its wanton destruction by fire and flood, earthquake and storm, and its ceaseless warfare for survival. There were no tobacco advertisements then to warn us that "Nature in the raw is seldom mild."

In addition to the view of identifying Nature with God, and looking at the world through rosy glasses, a great deal of mysticism and mumbo-jumbo was added from time to time. Because some characteristics of organisms are integral, such as the arrangement of floral parts of certain plants in fives, numerology came to be incorporated in an attempt to explain

the unexplainable. And so, according to some romanticists, the number five represented the Diety. Other peoples in other times have, for no better reasons, identified Him with one or with twelve. Oken, a prominent leader in this movement, stated: "The highest mathematical idea or the basic principle of mathematics is that zero equals zero." He then tells us that God is O, with plus and minus quantities representing the world, space, or other conceptions, all of which sounds so ridiculous today that we wonder how serious, sane, even brilliant people could ever entertain such views.

Not least among reasons why romanticism took hold of people's fancies, however, and endured for a hundred years—right down to within a century of our own day—was the personality of its great champion. To some he was almost a god, to others a universal genius, a world-renowned authority on all matters of art and science, and to his intimates he was a handsome, dashing, and compelling figure, a man of many loves. One of his biographers concludes that Goethe's own life was his greatest work and that the fullness and richness of his humanity were his best claim to greatness.

Goethe's family was a well-to-do middle-class one, and his early education was supervised first by his father and later by tutors. At 16 he went to the University of Leipzig, where he wrote poetry and studied art and law. Forced to leave Leipzig because of illness, he studied religious mysticism and occult lore while recuperating, then, in 1770, went to the University of Strasbourg, where he completed his legal training and found time to dabble in medicine.

Returning to Frankfurt in 1771, with his license to practice, he was already becoming nationally known as a poet and continued writing while earning his livelihood as an attorney. Attracting the attention of Prince Karl August of Saxe-Weimar, a small duchy, now a district of Thuringia, young Goethe was invited to visit the little capital city of Weimar. Here he went in 1775, and there he stayed through the remainder of his long life of eighty-three years, becoming its leading force and greatest citizen.

Within a short time Prince Karl, captivated by the brilliant and romantic Goethe, made him successively an official poet, social director, and minister of state, a post he held until 1790. Goethe took up agriculture and mining, important aspects of life of the duchy, and such studies led to his later profound interest in botany and geology; hence, of course, other sciences. The years 1786-88 were spent in a trip to Italy that altered many of his views, and he returned to Weimar restless and unsettled. In 1791 he was made director of the ducal theater, and held this position for 26 years, until 1817. It was in the post-Italian days that he became absorbed in science, producing his first major work, on the "metamorphosis" of plants, in 1790, and two parts of his work on optics in 1791 and 1792. Beginning in 1794, the poet Schiller stimulated Goethe along literary lines, but after Schiller's death, in 1805, the poet Goethe became the scientist Goethe. He had studied anatomy at Jena, and now he turned to morphological problems as well as continuing his interest in optics. He married Christiane Vulpius in 1806, but she survived only ten years. The great man died at Weimar as a robust old man in full possession of all of his faculties. Napoleon said of him, at their meeting at Erfurt, "*Voilà un homme!*"

The most important building in Weimar is the former palace, erected in 1789-1803 under Goethe's supervision. It contains a series of rooms dedicated to the poets Goethe, Schiller, Herder, and Wieland. Goethe's house, where he lived from 1782 to 1832, still stands, but the theater he built in 1825 was torn down in 1907 to make way for a more modern structure. In the grand ducal vault at the cemetery, lying side by side, are the remains of Germany's two greatest poets, great friends in life—Goethe and Schiller.

Of his vast literary production, Goethe himself prized his scientific writings most highly, whereas today's critical appraisal would demote them to the bottom of the list. We rate his poetry, including his wonderful lyric songs, as of highest quality and most likely to endure, his dramas second, and his

novels third. Then would come his art criticism and miscellaneous productions, and last of all his great works in biology and physics.

As a matter of fact Goethe, like so many others of his period, was mainly an arm-chair scientist, attempting to reason results by logic. In some cases, as in his studies of certain bones and his work with light and color, he made original observations or performed experiments. Yet when we examine his scientific writings we find the teachings of the romantic school, altogether discredited today, or that his work was erroneous, or it originated with someone else.

In comparative anatomy, he described the premaxillary as a separate bone of the upper jaw in certain mammals. The anatomist, Camper, wrote Goethe and congratulated him on his discovery of this bone in the walrus. In other words, the professional investigator wrote the amateur dabbler and congratulated him on a trivial matter; yet on such unimportant findings a part of Goethe's reputation as a scientist rests. The poet then went on to claim the presence of this premaxillary bone in man, which is false. It fuses with the maxilla during development and is not present as a separate bone in the adult.

The famous but discredited vertebral theory for the origin of the skull is linked with Goethe's name and authority. He discoursed upon this subject. But the idea originated with his colleague, Oken, and was carried to its extreme development by the British anatomist, Owen. This theory states that the skull is made over from modified vertebrae, and was proved to be an impossible notion by Huxley. Goethe also took up the cudgel for archetypes, believing that each existing species should be compared with some perfect model, although he is necessarily vague as to details. This ideal, perfect model for each kind of animal has long been considered a ridiculous hypothesis. Goethe introduced the term *morphology*, a basic word in the biological sciences today, but he used it to mean something very different indeed.

In botany, the German romanticist developed a major work on the "metamorphosis" of plant leaves; that floral parts such as petals and stamens are modified leaves, but this had all been done by others at an earlier date. Without any suitable grounding in geology he championed "Neptunism", that the rocks of the earth's crust are primarily of aqueous origin—laid down under water—as opposed to "Vulcanism", in which it was stated that these rocks were of igneous origin; had been molten in a heated interior. Here, too, because of inadequate background and lack of original research, he backed the wrong horse.

With a stubbornness and fiery zeal worthy of a better cause, he opposed the Newtonian concepts of light and color;



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again, without suitable preparation in mathematics. Through years of work he tried to prove Newton incorrect in his interpretation of the breaking up of a beam of white light into the colors of the spectrum when the beam is passed through a prism; but all his efforts ended in dismal failure.

On the other hand, Goethe is credited with successes in certain lines. As a collateral effort to his work with prisms, he made worthwhile discoveries on complementary colors and other subjective results. His book on "metamorphosis" in plants, with its distinctly evolutionary flavor, made such a hit with the great Haeckel, of the following century (1834-1919), which was one of exact, methodical German science, that this celebrated teacher linked together the names of Lamarck, Goethe, and Darwin as the founders of evolution. Haeckel was, in fact, the last of the romanticists.

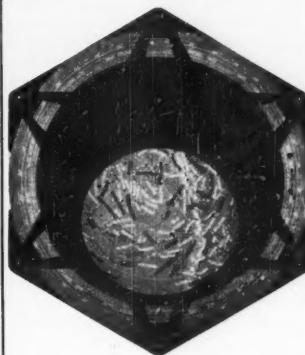
Some of Goethe's modern critics have leaned toward the harsh side of considering all of his scientific efforts as trivial and worthless; others have been much more generous. Probably the middle ground is fairest. This would assign no lasting value to any of his alleged discoveries but would give him considerable credit as a stimulus. Owing to his prominence, Goethe's writings exerted a powerful influence, and many a morphologist was thereby prodded to seek further. If the vertebral theory was wrong, it took considerable research to prove that this was the case; if there was no upward trend in animals toward an idealized perfection, still someone's mind could be led into a speculation on survival of the fittest. Goethe definitely paved the way for a general acceptance of evolution.

Ranked second in letters only to Shakespeare, Goethe has been called the last great universal genius. He is clearly the most romantic figure in the history of science.

HISTORICAL OUTLINE

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series has saved his earlier issues, it would be well to review the *Vocabulary for Parasitology and Public Medicine*, which appeared in the April, 1946, number of this department. A few of the more important definitions will be repeated here, as certain terms are essential, constituting basic tools in a discussion of the historical development of this science.

A *facultative parasite* is one that can take it or leave it, at least at certain periods in the life cycle. The adaptations to the parasitic way of life are imperfect or partial, as with the case of certain fly larvae that can dwell in and live upon manure or other decaying organic matter, or can develop within the digestive tract of a mammalian host. Human intestinal myiasis (infestation by fly larvae) is a serious condition, but the occurrence of flies in such a situation is more or less opportunist or accidental and not deliberately sought. On the contrary, a typeworm larva (or adult) is compelled by its high degree of adaptation to make its home solely in a certain part of the body of certain host species, and is an *obligate parasite*.

We have seen a new slang term for the lunch-counter type of restaurant—an "eat-it-and-beat-it." This exactly describes the prandial relationship to the host or victim of the mosquito, actually a predator rather than a parasite. But if the female mosquito is to be included among the parasites of man, then she is an *obligate* one, inasmuch as she must have a blood meal and cannot live upon the nectars enjoyed by her nonsanguinary mate. The flea is still more *obligate* in that, while it removes its proboscis between meals, it does not leave the body of the host. Both sexes "beat it" only to the extent of running about among the feathers or hairs of their hapless vehicle.

When considering some parasites, notably flukes, the terms monogenetic, digenetic, and trigenetic are most useful. They enumerate the number of hosts in the life cycle—for example, the sheep liver fluke, that sometimes infests man, spends its larval period in an aquatic snail, its adulthood in the mammalian host, and is classed as *digenetic*. The Chinese human liver fluke, *Clonorchis*, has a first larval stage in a snail, a second in a fish, and the mature span in man or other mammal. This parasite is *trigenetic*. The hookworm, *Necator*, on the other hand, spends its entire parasitic existence within the body of a single host, and passes from one individual of this species to another without the intervention of some other host species; it is *monogenetic*.

When more than one kind of host is required in order that a parasite may complete its life cycle, some way of indicating their succession is needed. The animal in which a larval stage is passed is an *intermediate host*, while that harboring the adult parasite is the *final* or *definitive host*. As to which stage of the parasite is considered the adult, that in which sexual reproduction takes place is so designated. Larval reproduction, if any, is by some asexual process, as budding, or the secondarily derived asexual method known as parthenogenesis.

The *natural host* of a parasite is the normal or customary one. In well-established cases of long-enduring host-parasite relationships, both parties will have made such concessions and adjustments that the invader is tolerated and the injuries to the host are usually minor and non-lethal. Not so the case of the *accidental host*, unaccustomed to the particular parasite and with no long history of acquired immunity; his injuries may be serious or fatal.

From the standpoint of disease transmission, the organism that produces the infection is a *pathogen* (as *Trypanosoma*, the flagellate protozoan that causes African sleeping sickness), that which harbors the pathogen as a natural host is a *reservoir* (as a number of species of African antelopes), and that which

transmits the parasites from host to host is a *vector* (as *Glossina*, the tsetse fly). The insect, in this example, seeks a blood meal and is actually a predator, but it is customary to consider both the trypan and the fly as parasites. Man is an accidental host for this pathogen, and suffers severely through that unfortunate circumstance.

Armed with this technical background, we shall proceed with the sometimes weird, often amusing, and always interesting account of the historical development of the science of parasitology in future installments.

NEW A. O. MICROSCOPE

Recently we announced a new model among Bausch & Lomb microscopes, with simplified design and lowered costs. Now comes release of the corresponding production by the other of America's two major optical houses, the Scholander's Microscope, Series 78-79, of the Scientific Instrument Division (Spencer) of the American Optical Company, Buffalo.

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The optics are standard Spencer items. The various objectives have identifying bands of different colors, available in seven different items, from 3.5X to 43X; eyepieces are 5X or/and 10X. There is no attempt to include a substage condenser or oil immersion objective, these being beyond the purposes of the new instrument.

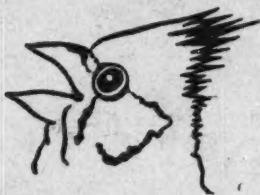
In the 78 series, all parts are locked in and cannot be removed—stage clips, objectives, and eyepiece. This is ideal for teaching purposes and will be welcomed by many long-suffering mentors of rash laboratory youth. Within reasonable limits the microscope is tinker-proof and breakage-proof. There is nothing to come loose or drop out, and if knocked over there is small likelihood of damage.

The 79 series is a parallel one, but the optical parts are removable, for interchanges. This feature will be preferred by amateur microscopists and others not concerned with teaching large classes. Prices range from \$61.50 for No. 78A, with a single objective, divisible so as to yield final magnifications of 42X and 100X, to \$127.50 for a triple nosepiece job with three objectives and two eyepieces, all removable. Probably the most popular item among teachers will be the double nosepiece No. 78B, with two objectives and one eyepiece, yielding final magnifications of 100X and 430X, all parts locked in, at \$99.50. The same instrument with removable parts, No. 79B, is \$101.00. Extra light bulbs are 25¢, and a carrying case is \$9.00 extra.



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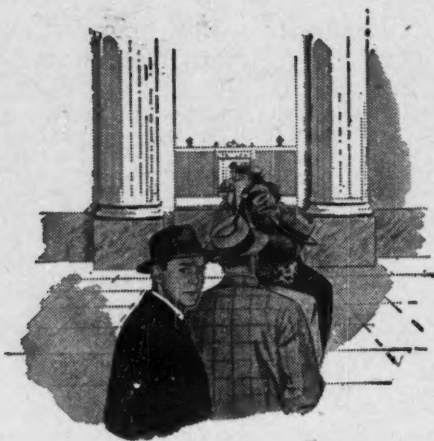
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